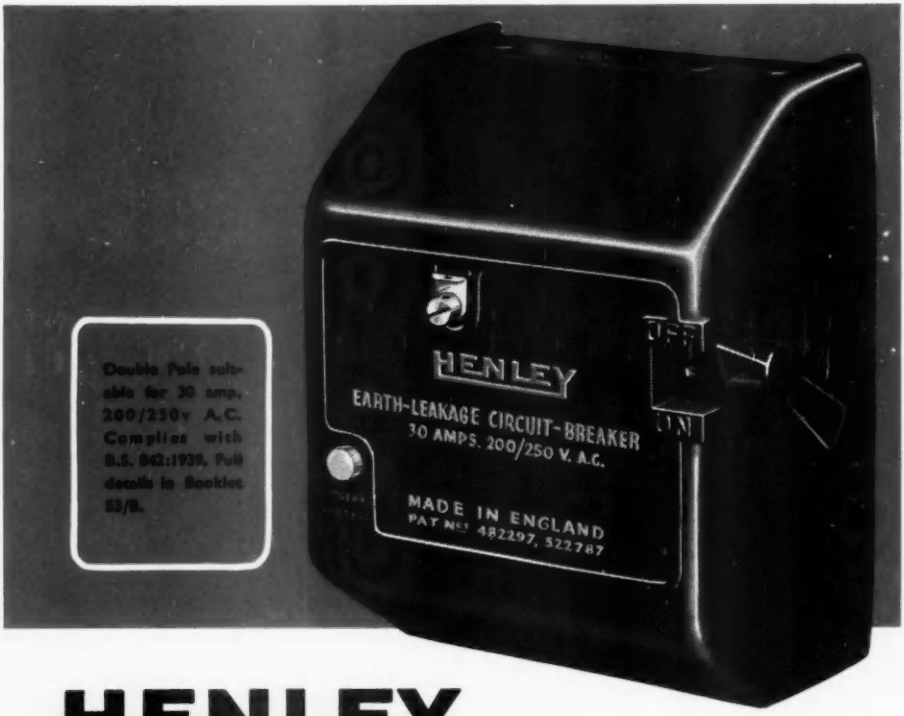
ELECTRICAL TIMES

THURSDAY
10 AUGUST
1950
SIXPENCE


Double Pole suitable for 30 amp. 200/250v A.C. Complies with B.S. 842:1939. Full details in Booklet 53/B.
HENLEY
EARTH-LEAKAGE CIRCUIT-BREAKER
30 AMPS. 200/250 V. A.C.
MADE IN ENGLAND
PAT Nos 482297, 522787

HENLEY

EARTH-LEAKAGE CIRCUIT-BREAKERS

(VOLTAGE OPERATED)

W.T.HENLEY'S TELEGRAPH WORKS CO. LTD. 51-53 HATTON GARDEN, LONDON, E.C.1

m and i

MICANITE, built-up mica insulation, is manufactured and supplied in every form required by the Electrical Industry, including Commutator and Moulding Micanite, Flexible Micanite, Mica Tapes, Micafolium, Heat Resisting Micanite and Formers, Tubes, Commutator Rings and Separators.

THE MICANITE & INSULATORS CO., LTD.

EMPIRE WORKS • BLACKHORSE LANE • WALTHAMSTOW • LONDON • E.17

BRANCH OFFICES at BIRMINGHAM, CARDIFF, GLASGOW, MANCHESTER and NEWCASTLE-UPON-TYNE and representatives in most countries throughout the world.

Manufacturers of MICANITE (Built-up Mica Insulation). Fabricated and Processed MICA. PAXOLIN Laminated Materials. PANILAX Laminated Materials and Mouldings. EMPIRE Varnished Insulating Cloths and Tapes. HIGH VOLTAGE BUSHINGS and TERMINALS. Distributors of Micoflex-Duratube Sleevings and Micoflex-Durasleeve (Plastics-covered flexible metal conduit).

'ENGLISH ELECTRIC'

Simplified range of standard distribution Transformers can now be supplied incorporating

'D'-TYPE CORES

USING

COLD-ROLLED STEEL

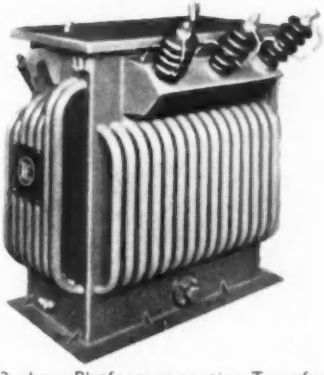
GIVING

LOW IRON LOSS

AND

LOW MAGNETISING CURRENT

Range of Ground Mounting Transformers 100 kVA, 150 kVA 200 kVA, 250 kVA three-phase



100 kVA, 3-phase Platform mounting Transformer

Range of Pole or Platform Mounting Transformers 10 kVA, 15 kVA 25 kVA, 50 kVA 100 kVA single or three-phase

For full details write to:—

The ENGLISH ELECTRIC Company Ltd.

TRANSFORMER DEPARTMENT - - - LIVERPOOL, 10

Works also at : STAFFORD : PRESTON : RUGBY : BRADFORD

A

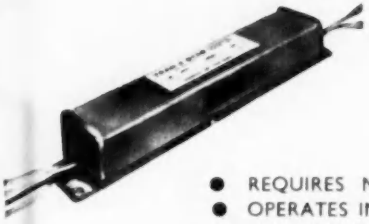
FLUORESCENT LIGHTING

THE NEW

TRAN ★ STAR

REGD. TRADE MARK

CONTROL UNIT

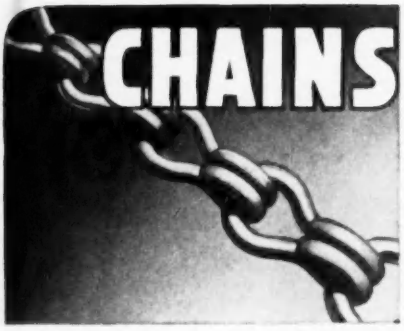


COMPLETELY SELF-CONTAINED WITH BUILT-IN RADIO AND POWER FACTOR CONDENSERS

- REQUIRES NO SPECIAL LAMPS OR EARTHING STRIPS
- OPERATES INSTANTANEOUSLY EVEN IN LOW TEMPERATURES
- ELIMINATES STARTERS AND STARTER CONNECTIONS
- IS COMPLETE. READY FOR FIXING

Sole Manufacturers:

INDUCTIVE APPLIANCES Ltd., 18, DEAN STREET, NEWCASTLE UPON TYNE 1



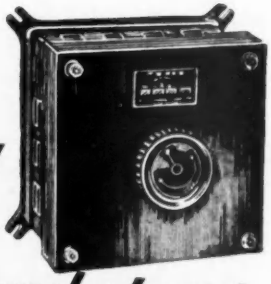
Chains of every type for the suspension of Fluorescent Tubes, Domestic Fittings, etc. Right finish and price, prompt delivery. Samples and advice from THE Chain people.

A. J. PRATT & SONS, LTD.

Woodbridge Street, London, E.C.1.

Tel.: CLErkenwell 3742-3

Shunt Field Regulators



For Motors, Generators and Alternators. Also as Series Regulators for voltage, heat and speed control. We shall be pleased to send full particulars and prices on request. And remember, the advice of Cressall Technicians is always available.

CRESSALL

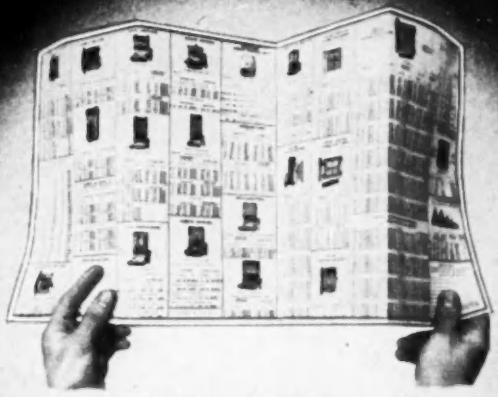
Registered Trade Name of

THE CRESSALL MANUFACTURING CO., LTD.

Tower Street, Birmingham 19.

Telephone: ASTon Cross 2666 (3 lines).

Telegrams: "OHMIC," Birmingham.



PUBLICATION Nº 450GL GIVES
CONSOLIDATED REDUCED PRICES OF
BILL SWITCH AND DISTRIBUTION GEAR

A COPY WILL BE SENT ON REQUEST

SCOTLAND & N. IRELAND.
J. D. HARRIS,
47, NETHERBURN AVENUE,
NETHERLEE,
GLASGOW. S.4.

BILL SWITCHGEAR LTD
ASTON LANE. PERRY BARR
BIRMINGHAM 20

INDIA & PAKISTAN
J. A. B. JACOBSEN,
22-24 RITHERDON ROAD,
LONDON S.W.17.

PHONE BIRCHFIELDS 5011 GRAMS "BILSWITCH" BHAM

1912 **1950**

Site of new Factory – 1924

The Story of BELLING *& Company Ltd.* No. 10

In the last chapter I mentioned about our moving to bigger premises and 1924 marks one of the outstanding years in the history of this Company as in this year I bought our new 10 acre site at Enfield. I well remember three or four of us going down to Southbury Road with a truck of tools, breaking down the wooden fence and putting a door just where our main entrance stands. Two of the men in question are still with us and both of them are foremen now.

We got out plans for six bays, quickly passed by the Council and quickly built. We started putting up our own buildings and have kept on doing so ever since. Foundations, walls, floors, roads, lavatories and all the rest!

We also undertook the job of connecting up to the main sewer and surface water drains. We had to tunnel some 25 feet below the main road with its tram lines. However, we managed quite successfully and by the time we finished we thought we knew as much about drains and sewers as anybody! The first six bays, covering some 24,000 sq. ft., we soon got equipped and into production and our total fire sales had reached by then nearly half a million in quantity. The walls of these new bays were built with a patent T formation of concrete blocks. Mr. C. A. Marques was one of the Engineers of the firm who supplied them and this is how we first met. Later on in June 1925 we decided to join forces with a capital of £500 each to form a new Company called Concrete Utilities Ltd., to make various pre-cast concrete articles. After a few years of making cable covers and similar work we started on concrete lamp columns and today we have by far the biggest production of these posts in England and they can be seen practically all over the British Isles. Naturally, we think we have the most pleasing designs. Mr. Marques is our active, everyday Director here and his efforts have built the business up to its present outstanding position.

Returning to Belling & Co. and the year 1924. In this year I see we also introduced a new range of cookers including a horizontal model with the oven at hob level and with the elements all of the plug-in type. Our first Plate and Dish Warmer on which our latest model is based was also illustrated in this 1924 catalogue.

I see from the patent record that in this year I took out a patent for a flickering fire based on a rotating mirror device. Another interesting step we took this year was to hand our advertising over to an advertising firm. Up to this time we had done it all ourselves, taking the photos, writing up the copy, setting the layout and then getting the blocks made, etc. This was becoming quite a business, so we eventually fixed up with Murphy Casson Ltd. (now C. R. Casson Ltd.) to let them see how they would get on with the job.

We have been with them ever since and the results of their efforts on the advertising side speak for themselves. Mr. Casson tells me we are their oldest client but even now we cannot always get them to do just what we want! Anyway, thank goodness they do not meddle with the wording matter of these advertisements although they do help us with the layout and the pictures.

The next chapter tells of our increased production at Enfield and introduction of further new designs.

C. A. Belling

Belling & Co. Ltd., Bridge Works, Enfield, Middx. Tel.: Howard 3242

CRC10

THE R&M *Duplex* DOUBLE PURPOSE BEARING

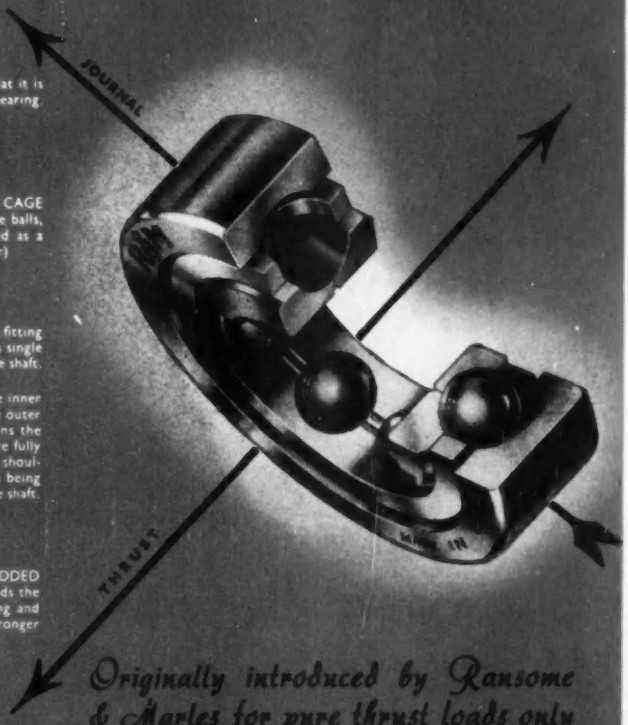
MAXIMUM NUMBER OF BALLS that it is possible to use with ANY cage type bearing.

BALLS EFFECTIVELY RETAINED IN CAGE by a patented caulking method. The balls, cage and outer race can be handled as a one-piece unit. (Patent Applied for)

RADIUSED INNER RACES make the fitting of the two halves as easy as fitting a single race and prevents any peening of the shaft.

SPLIT INNER RACE. Although the inner races are, as units weaker than the outer race, with the majority of applications the inner races are a fit and are therefore fully supported by the shaft. The abutting shoulders and nut ensure the inner races being pulled up square with the axis of the shaft.

ONE-PIECE OUTER RACE FOR ADDED STRENGTH. Under pure thrust loads the outer is unsupported by the housing and therefore of necessity must be stronger than the inner races.



BALL & ROLLER R&M BEARINGS

Originally introduced by Ransome & Marles for pure thrust loads only in either direction, or for combined journal and thrust loads, provided the thrust is at all times greater than the journal load.

RANSOME & MARLES BEARING CO. LTD

NEWARK - ON - TRENT ENGLAND

Cobra re-impregnation

can save them where they stand

Recent investigation shows that an average of 1 in 5 transmission poles in use in this country are decaying. The capital sum for replacement would be formidable. The Cobra method of re-impregnating these poles where they stand, by deep-injection of a special preservative, can save thousands of them—in many cases doubling their life.

Write for details of the Cobra Service which has saved over two million poles already in the last twenty years. It includes expert inspection of poles, specialised treatment and a report on their condition.

COBRA (WOOD TREATMENT) LTD., 37 MANCHESTER STREET, LONDON, W.1. *Telephone: WELbeck 1395*

Affiliated Companies in France, Belgium, Italy, Holland, Spain, Switzerland, Canada and U.S.A.

T.A 3068

COOKING IN CRAMPED QUARTERS?

The ready-made solution

is the Creda Cadet. Not just another breakfast cooker—it's designed to do *all* cookery jobs. The Cadet is *fully insulated*, has a thermostatically controlled oven, radiant type boiling plate controlled by Simmerstat and a warming cupboard. And, so important from the customer's point of view—the Cadet connects to an ordinary domestic heating point. Total wattage 2,850 Catalogue No. CTI

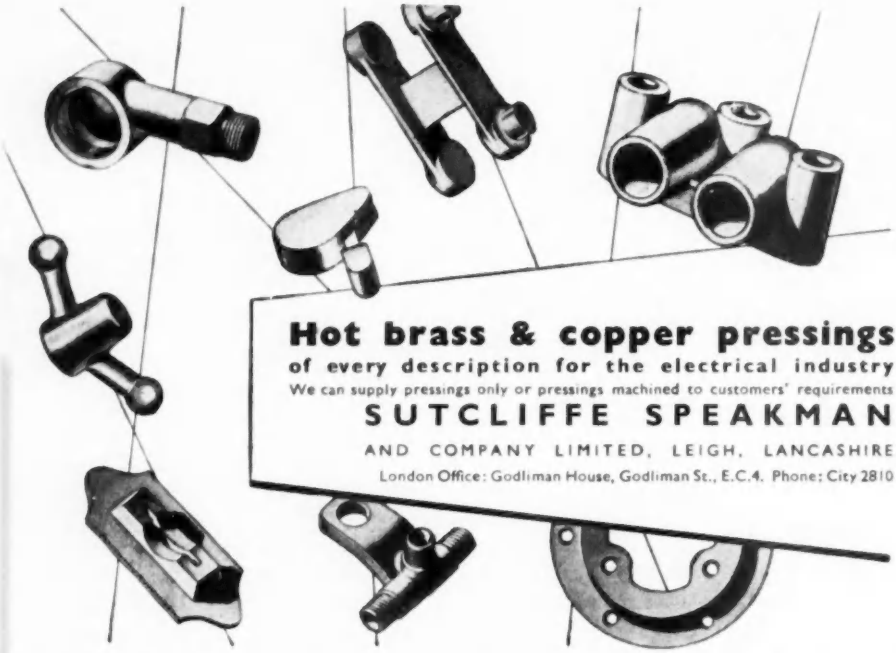
QUICK DELIVERY

Creda CADET

MADE BY THE HOUSE OF Simplex

SIMPLEX ELECTRIC COMPANY LIMITED
OLDBURY BIRMINGHAM AND BRANCHES

A TI COMPANY



Hot brass & copper pressings
of every description for the electrical industry
We can supply pressings only or pressings machined to customers' requirements
SUTCLIFFE SPEAKMAN
AND COMPANY LIMITED, LEIGH, LANCASHIRE
London Office: Godliman House, Godliman St., E.C.4. Phone: City 2810

'ASHLAM'–Grade G.S.

SILICONE BONDED GLASS FABRIC BOARD

★ **HIGH Temperature Electrical Insulation**

★ **VERY LOW Power Factor — ·001 at 1000 cycles**
·002 at 100 megacycles

★ **VERY LOW Water Absorption**

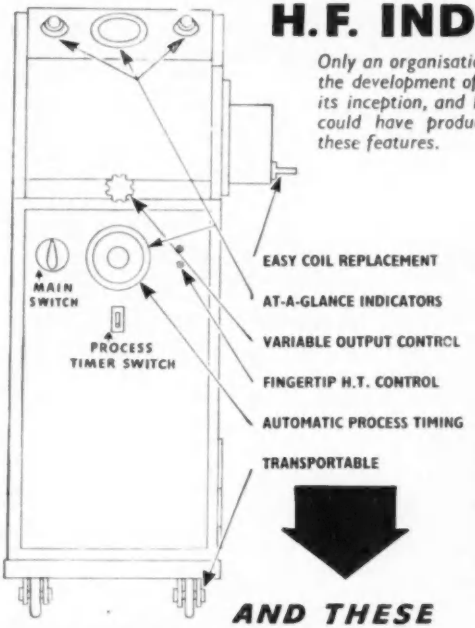
If you want to know more about 'ASHLAM'
ask **ASHDOWNS**

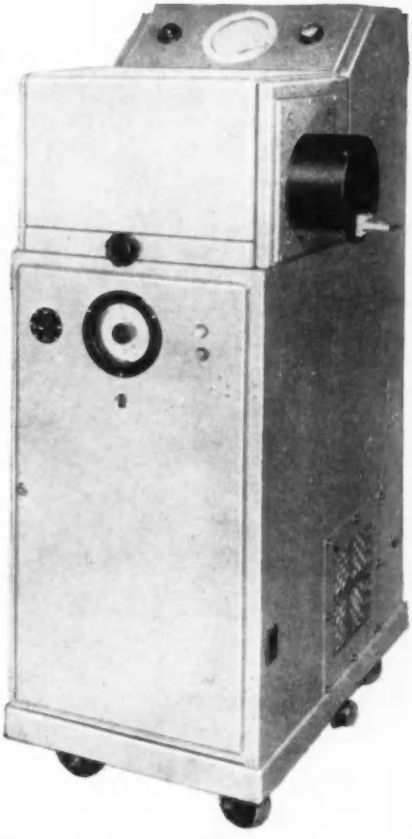
ASHDOWNS LIMITED, ECCLESTON WORKS, ST. HELENS, LANCS. *Telephone: St. Helens 3206*
Ashdowns Ltd. is a subsidiary of Pilkington Brothers Ltd. *'Ashlam' is the registered trade mark of Ashdowns Ltd.*

Only G.E.C. could have produced this ultra-modern

H.F. INDUCTION HEATER

Only an organisation which has been intimately concerned with the development of the high frequency heating technique since its inception, and backed by a wealth of practical experience, could have produced a high frequency generator with all these features.





AND THESE ADDITIONAL FEATURES which, to you, mean Economy and peak production

1. 2 kw. Output—variable.
2. New and improved method of coil connection.
3. Single valve oscillator.
4. Rapid re-matching.
5. Variable position of heating inductor.
6. Full circuit protection.
7. Robust construction.
8. Minimum number of controls.

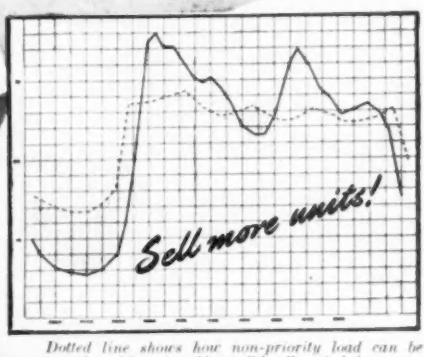
The Catalogue No. is **PH 6056**

FINISH: CREAM & GREEN

AVAILABLE IMMEDIATELY

THE GENERAL ELECTRIC CO. LTD., MAGNET HOUSE, KINGSWAY, LONDON, W.C.2

There are more RYTHMATIC Ripple Control installations in Gt. Britain than those of all other systems



Dotted line shows how non-priority load can be transferred from 'peak' to 'off-load' periods by means of Rythmatic ripple control.

RYTHMATIC Centralised Ripple Control enables supply authorities to maintain a closer relationship between generating capacity and demand by attracting additional consumers with domestic off-peak load requirements. More units can be sold without any addition to existing generating plant and without interfering with industrial consumption.

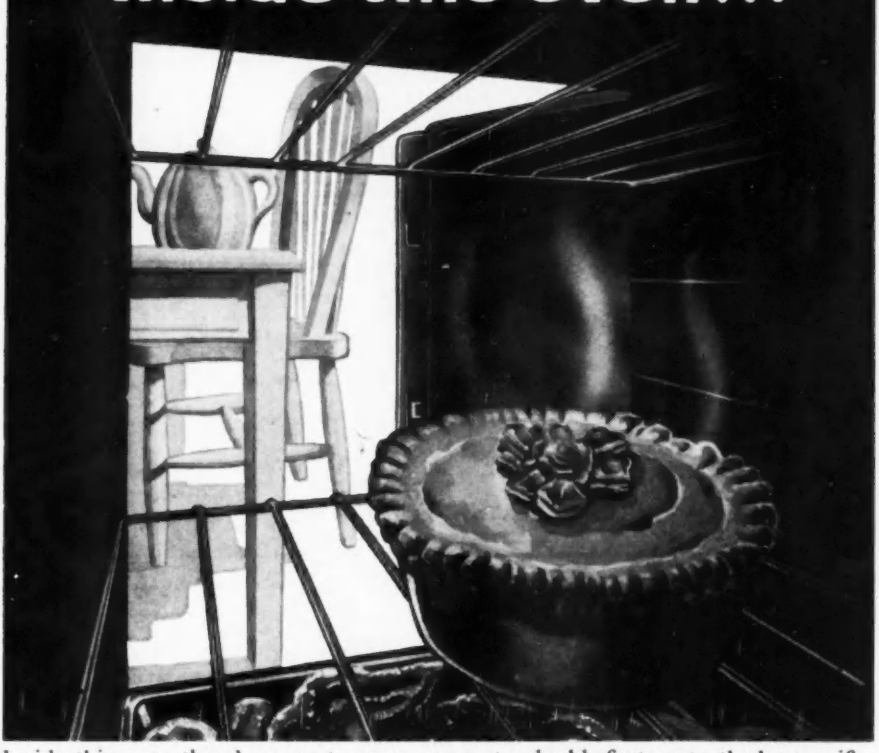
Write for further information.

RYTHMATIC

RIPPLE CONTROL EQUIPMENT

Automatic Telephone & Electric Co. Ltd.
Strowger House, Arundel Street, London, W.C.2.
Telephone: TEMple Bar 4506.
Telegrams: Strowger, Estrand, London.
STROWGER WORKS, LIVERPOOL, 7
A3362-C23

Inside this oven...



Inside this oven there's room to spare, a most valuable feature to the housewife. "XCEL" Cabinet Cookers are also available in alternative vitreous enamel finishes at no extra charge. One of the many reasons for the popularity of "XCEL" Cookers.

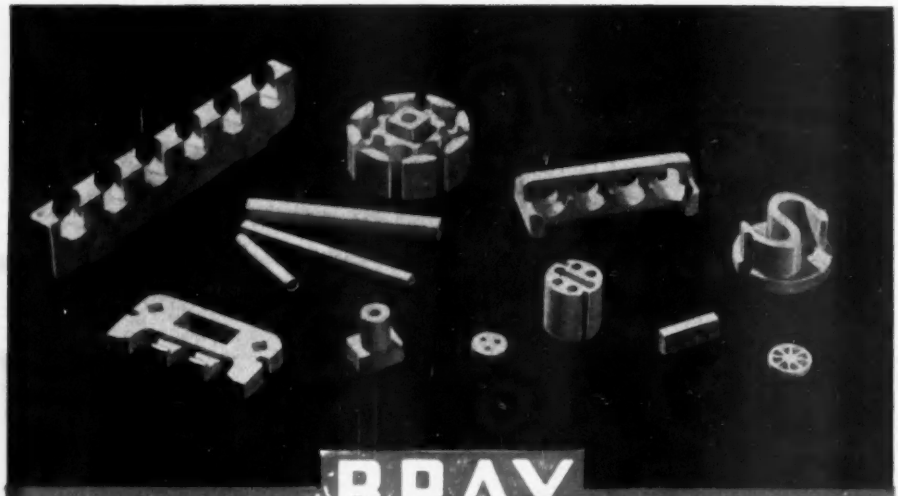
The largest oven of any cooker at the price

Write for complete details

XCEL ALL BRITISH ELECTRIC COOKERS

ELEXCEL LTD., VICTOR WORKS, BROADGREEN, LIVERPOOL, 14

Telegrams: 'XCEL,' Liverpool. *Telephone: Childwall 2201 (5 Lines)*



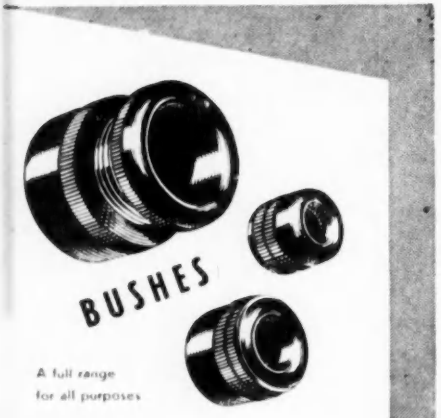
BRAY

ELECTRO-CERAMIC INSULATORS & REFRACTORIES

for the TELECOMMUNICATION, RADIO & ELECTRICAL TRADES.

manufactured by GEO. BRAY & CO. LTD. LEEDS 2. ENGLAND.

Telephone 20981 (8 lines) - Telegrams "BRAY LEEDS 2"



BUSHES

A full range for all purposes

Litholite

PLASTIC MOULDERS

FOR NEARLY 50 YEARS

Litholite Insulators & St. Albans Mouldings Ltd., Sandown Road, Watford

Watford 4494

BARLECTA

STOP PUSH BUTTON for Emergency Control of Motors, etc.

Supplied with or without ¾ in. conduit entry with chromium flange at extra cost.

Rating: 500v 2 amps. A.C.

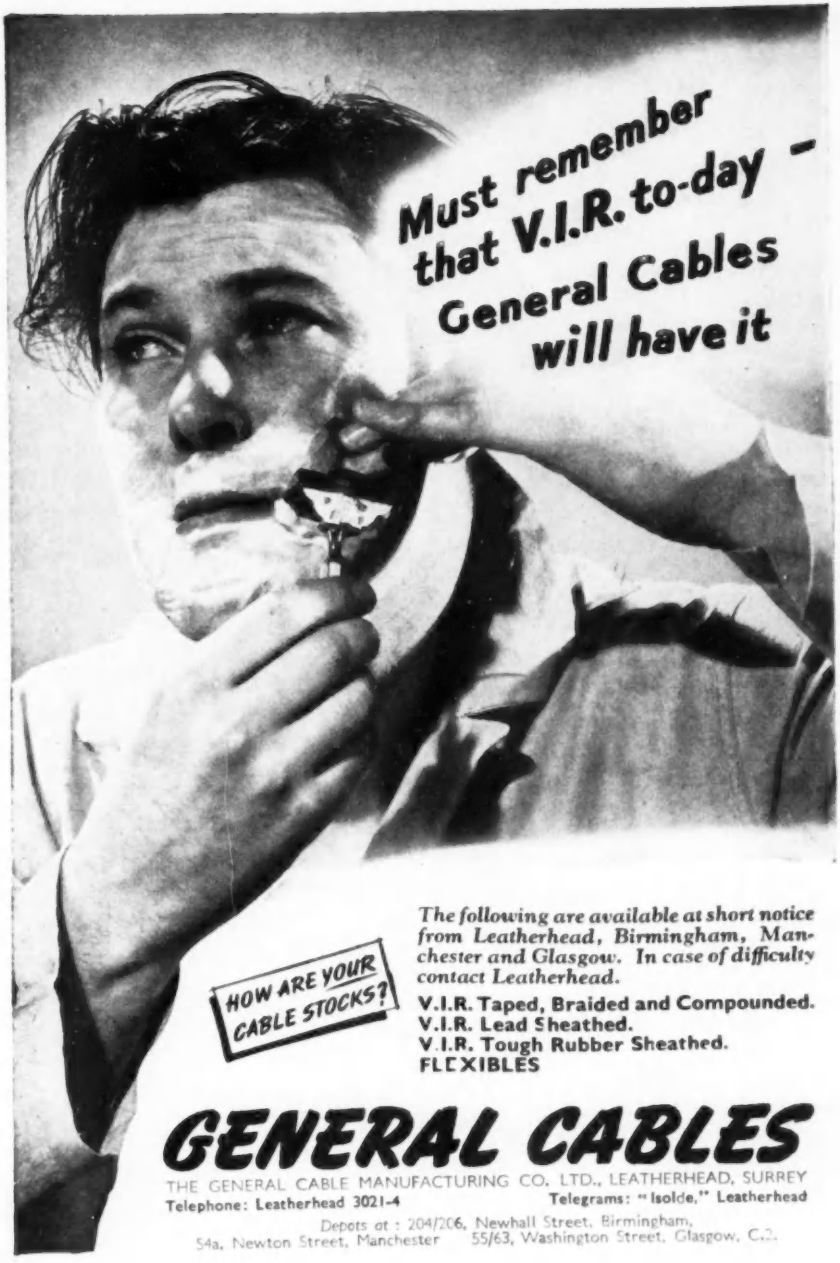
Ask for our List 15749/"E.T." for further details. This List also includes our "ON-OFF" and "LIMIT" Switches.

BARRIES

ELECTRICAL AGENCIES LTD

KING STREET, BRIGHTON 1, SUSSEX.

Telephone: Brighton 28366 (7 lines)



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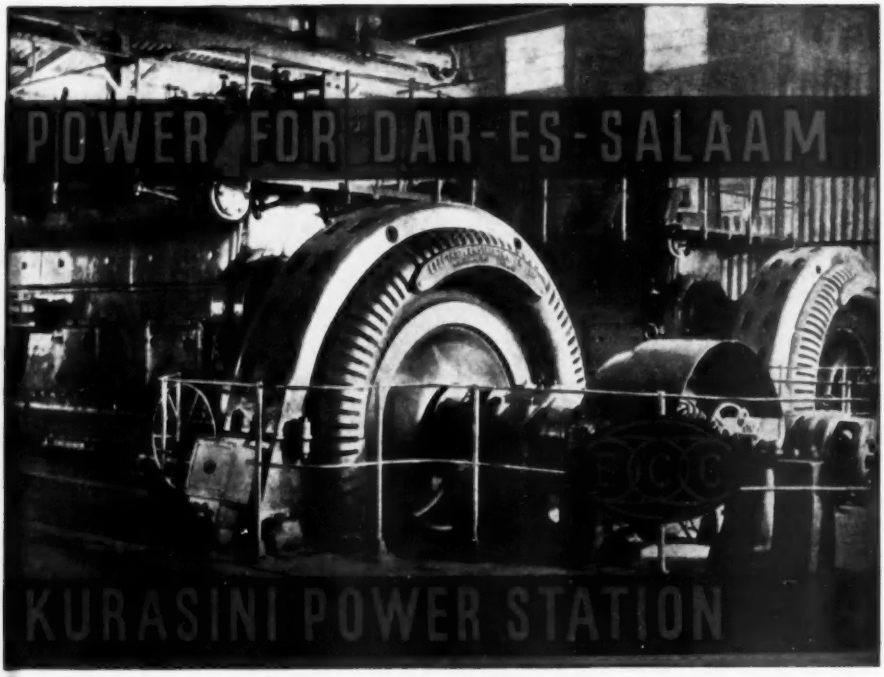
V.I.R. Taped, Braided and Compounded.
V.I.R. Lead Sheathed.
V.I.R. Tough Rubber Sheathed.
FLEXIBLES

GENERAL CABLES

THE GENERAL CABLE MANUFACTURING CO. LTD., LEATHERHEAD, SURREY
Telephone: Leatherhead 3021-4 **Telegrams: "Isolde," Leatherhead**

Depots at : 204/206, Newhall Street, Birmingham,
54a, Newton Street, Manchester 55/63, Washington Street, Glasgow, C.2.



has ELECTRIC-CONSTRUCTION ALTERNATORS

Two of the four 1190 K.V.A. Electric-Construction Alternators in the Kurasini Power Station of the Dar-es-Salaam and District Electric Supply Co., Ltd.

Other similar Electric-Construction Alternators are operating at the East African Power & Lighting Co. Ltd.'s Nairobi and Mombasa Island Power Stations.

All these installations have been supplied through Messrs. Balfour, Beatty & Co. Ltd., London, who are the Engineers and Contractors for the whole of the work.

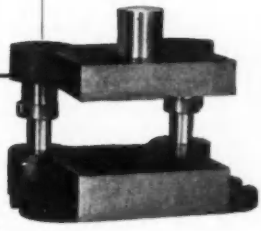
The ELECTRIC CONSTRUCTION CO. LTD.
WOLVERHAMPTON.

Electrical Machines, Switch & Control Gear, Rectifiers, Transformers

London Office: 61 Catherine Place, Westminster, London, S.W.1
Telephone: Victoria 3482-3

It's quicker and it's cheaper to order your Press Tool Sets from

Desoutter



STANDARD SIZES FROM STOCK

DESOUTTER BROS. LIMITED, THE HYDE, HENDON, LONDON, N.W.9. TELEGRAMS: DESPNUCO, HYDE, LONDON
TELEPHONE: COLINDALE 6346 (5 Lines)

CRC 67

Just wish...

..and it's yours!

How convenient to have such a magical delivery service now that the reduction in Purchase Tax is stepping up demand. But the B.N.E. service is nearly as good—stocks of *Charlton* Electric Water Heaters are held at B.N.E. depots all over the country and your requirements can usually be met within a matter of hours. The range includes Non-pressure, Pressure, 'Twin' Dual-purpose, and Cistern type Storage Heaters and Immersion Heaters and Circulators—in fact a type for every domestic requirement. Ring your nearest B.N.E. depot* when you have an urgent order.

**There is one at your local J. & P. Branch.*

BRITISH NATIONAL ELECTRICS LTD.

The Domestic Appliances Section of JOHNSON & PHILLIPS LTD.
NEWARTHILL · MOTHERWELL · SCOTLAND

A B.N.E. Product

Announcing...

BRUSH

EXPORT LIMITED

(A subsidiary of The Brush Electrical Engineering Co. Ltd.)

LOUGHBOROUGH ENGLAND

From July 1st, 1950, all overseas sales of *The Brush Electrical Engineering Co. Ltd.* will be handled by the new company, *Brush Export Ltd.*, which from the date mentioned assumed full responsibility for all business transactions between overseas customers (and their purchasing agents) and *The Brush Electrical Engineering Co. Ltd.*

PRODUCTS

TURBINES
TURBO-ALTERNATOR SETS
POWER AND DISTRIBUTION TRANSFORMERS
H.T. AND L.T. SWITCHGEAR
A.C. AND D.C. MOTORS AND GENERATORS

BRUSH

EXPORT LIMITED
LOUGHBOROUGH
ENGLAND

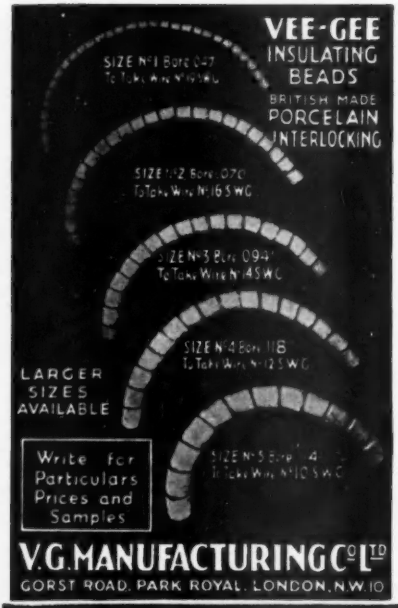
15.40

THE
IDEAL
WIRING
SYSTEM
FOR
HOUSING
ESTATES,
FARMS,
AND
ALL
PURPOSES
IS

"GILFLEX"

WRITE
FOR
DETAILS
TO

FLEXIBLE NON-METALLIC
CONDUITS LTD.,
208 TOTTENHAM COURT ROAD,
LONDON, W.1
Museum 5460



FOR EVERY GAUGE
2-40/0076 MAX.
2-3/036 MAX.
2-7/036 MAX.
2-7/044 MAX.
Better, easier, safer, more permanent than any other connector, for every wiring job, and for every gauge wiring—simple or complicated
SCRUTTON
PORCELAIN CONNECTORS

Made by
V. G. MANUFACTURING CO. LTD.
GORST ROAD, PARK ROYAL, LONDON, N.W.10
Distributors: S. O. Bowker Ltd. & GEE (Birmingham) Ltd. Birmingham

TECHNIQUE *for laying*

J.&P. **SEAMLESS**

ALUMINIUM

BRITISH PATENT NOS. 627815 & 627793

SHEATHED CABLES

...IN TRENCHES

The inherent tensile strength of aluminium permits J. & P. Aluminium Sheathed Cables to be laid in open trenches by a simple method which frequently offers a saving in labour.

The recommended procedure is to place cable rollers in the trench at intervals of eight feet or more, those around bends in the trench being placed on their sides. Adjacent to the first few rollers, bars or picket pins should be driven into the trench bottom in pairs close up to the cable to act as guides. A draw rope is attached to the end of the cable by means of a cable stocking and the cable drawn straight off the drum into the trench by hand haulage on the rope or by a winch if available. An improvised brake consisting of a plank of timber should be used to apply some friction to a flange of the drum. It is unnecessary to handle the cable directly during the running-out process, and in fact this should be avoided. It will be found that the cable will lie quite straight in the trench.

By the method outlined a small labour force is able to lay very large aluminium sheathed cables.

JOHNSON & PHILLIPS LTD.

CHARLTON LONDON S.E.7

The mark that means that "little more" in quality

SETTING THE

HIGH STANDARD OF

VERSCO

WASHDAY APPLIANCES

This VERSCO de-luxe "SQUARE" Wash Boiler is an example of the high standard of manufacture maintained throughout the complete VERSCO range of electric wash boilers and washing machines.

A fully illustrated leaflet is available on request.

UNIVERSAL BOILERS & ENGINEERING CO. LTD.

FULLEDGE WORKS, BURNLEY, LANCS. TEL.: 3121

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'Aerotight' Stiff Nuts are one-piece, all metal, self-locking nuts of proved efficiency on countless applications where vibration is encountered, and their tightening action is unaffected by oil, water or humid conditions.

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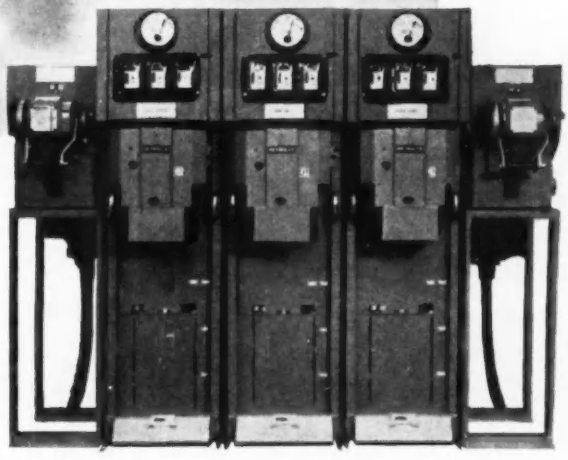

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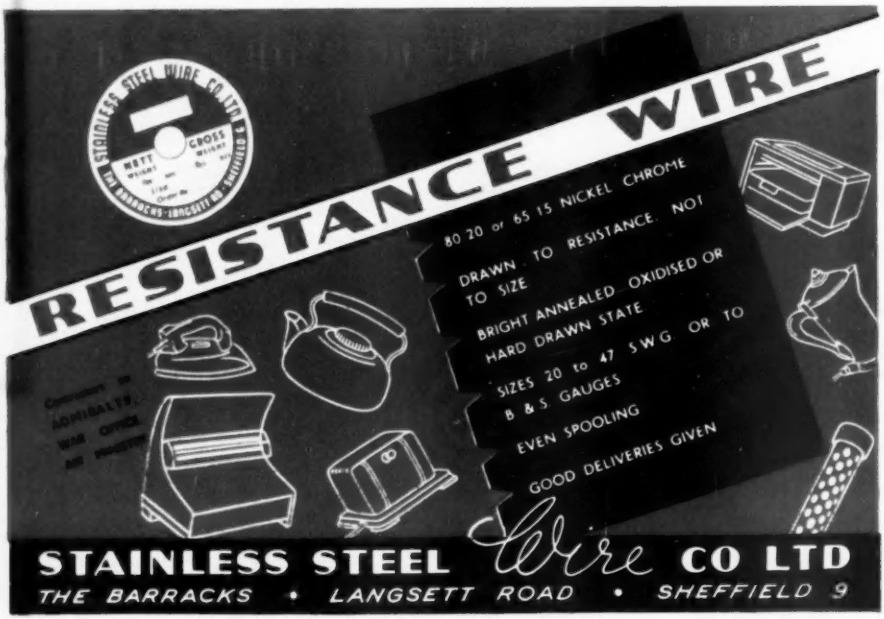
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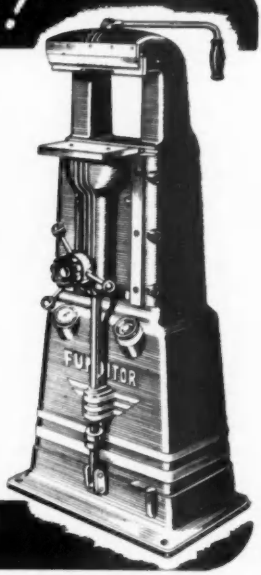

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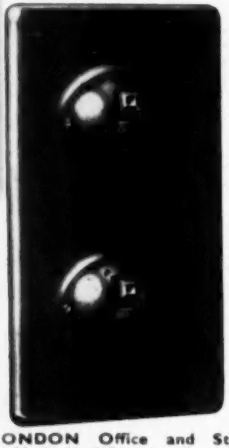

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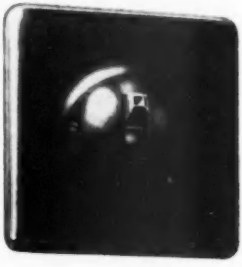

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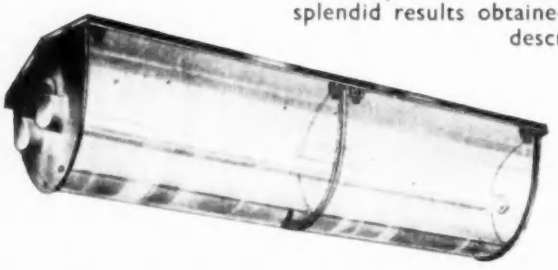

Revo "Sol-Etern" lanterns for Group A roads are made for use with 2, 3 or 4 80-watt 5 ft. fluorescent lamps, and the "Baby Sol-Etern" for Group B roads takes 2 20-watt or 2 40-watt lamps.

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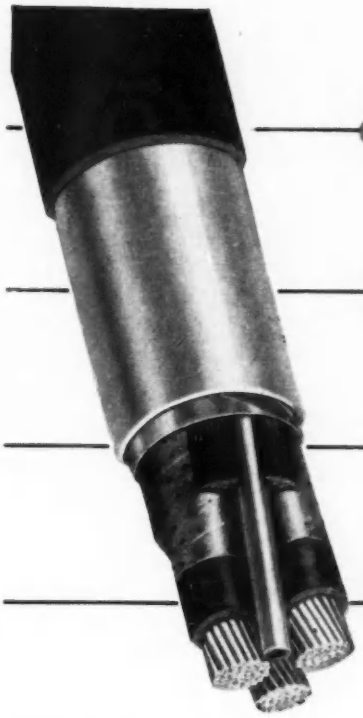

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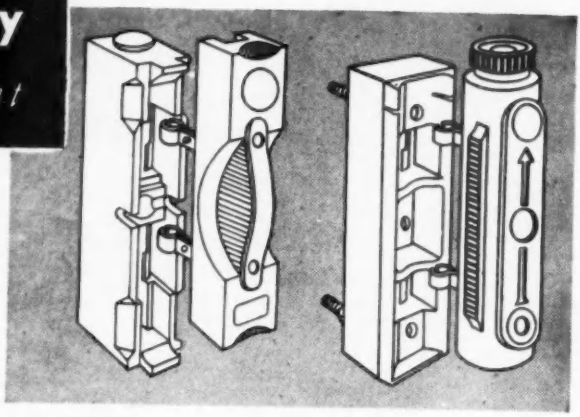

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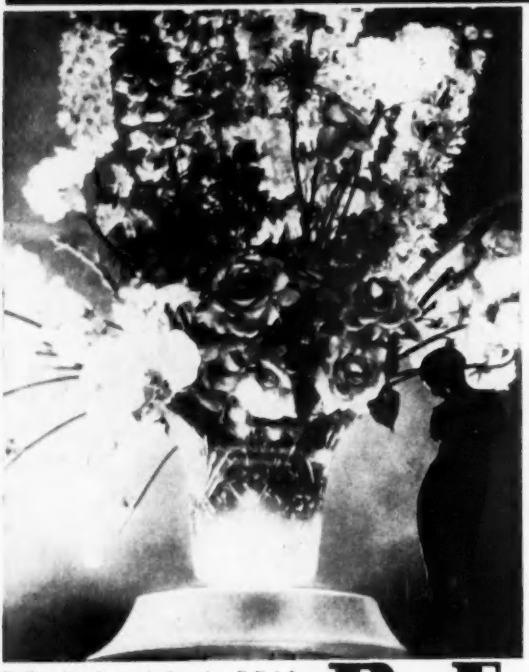

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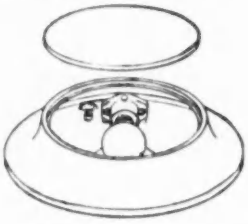

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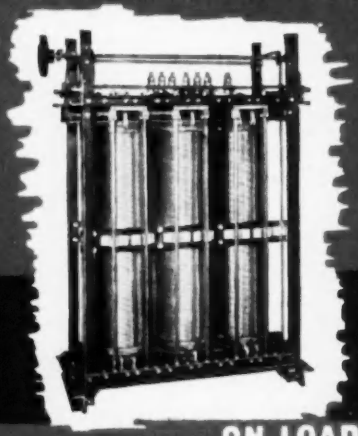

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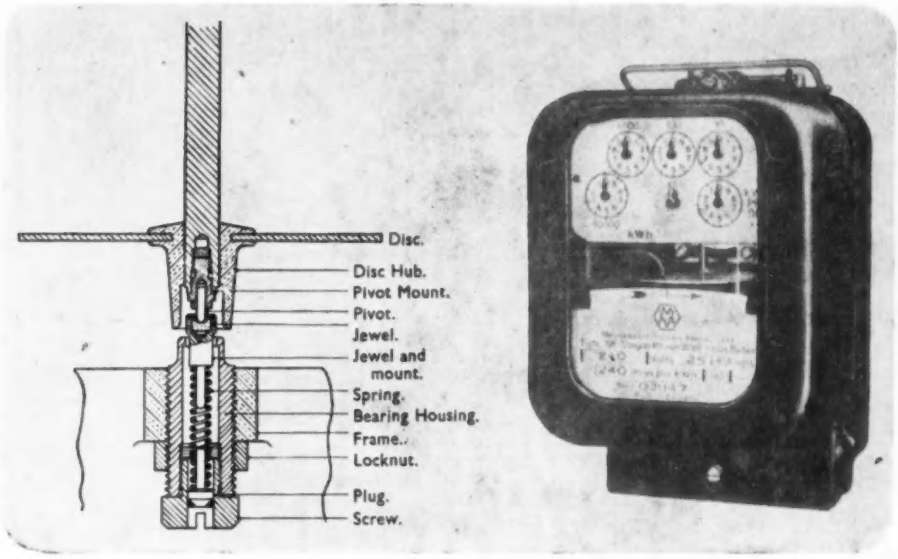

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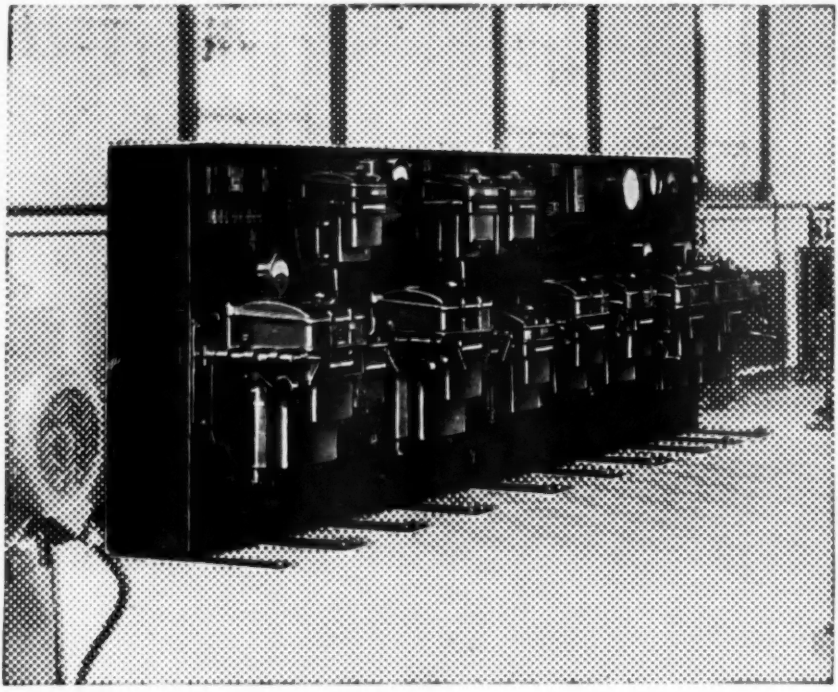
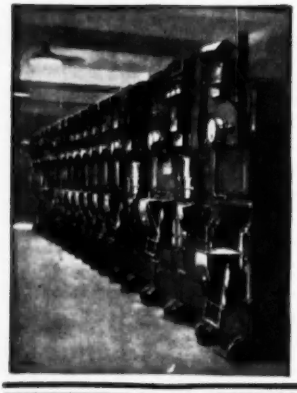


ELLISON HIGH and MEDIUM VOLTAGE SWITCHBOARDS



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Bottom High Voltage Switchboard in a power station.

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662

ELECTRICAL TIMES

Vol. 118 No. 3066 THURSDAY, 10 AUGUST, 1950

PUBLISHED EVERY THURSDAY

FIFTY-NINTH YEAR OF PUBLICATION

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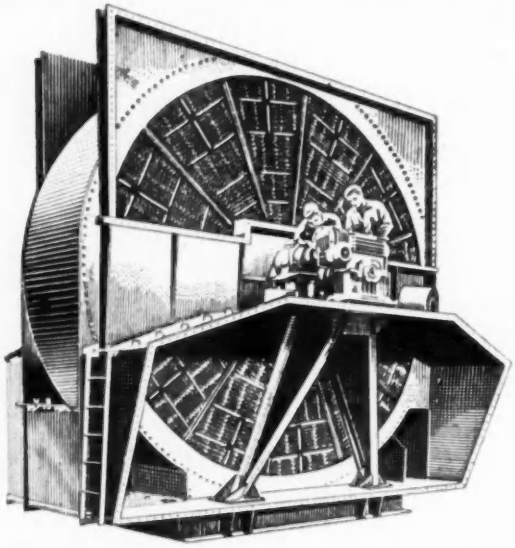

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Editorial

£5 MILLION MYSTERY SOLVED

AT long last the question has been answered on how the £5 million compensation for severance under nationalisation is to be paid to local authorities. The method specified in the Order issued last week is a complicated one, primarily based on the number of consumers, but including also allowances in respect of units generated, units sold and revenue. The four factors are nicely calculated to give exactly £5 million using the Commissioner's 1946-47 figures. Nevertheless, a full weight of provisos has been added to ensure payment of the £5 million, the whole £5 million and nothing but the £5 million. Thus we find that out of £5 million, not more than £1 per head may be paid in respect of any of the 7·5 million consumers, and if there is any money left over, it is to be divided equally amongst the authorities. Was such a complicated method really necessary for assessing this compensation, and is there, in fact, any logical thought which financially rates a consumer at 90 times that of the revenue he provides? We would like to know.

ELECTRICAL PROGRESS

IN former years we have referred to the statistics published by the Hulton Readership Survey in so far as they concern electricity consumers. The 1950 figures, which have recently been made available, reveal a continuing increase in electricity usage, and the principal figures are shown in the following table of percentages:—

	Gas and Electricity	*Electricity only*	*Gas only*	*Total with Electricity*	*Total with Gas*
1950	69	19	9	88	78
1949	68	18	11	86	79

The increase in electrical usage appears to be largely due to additional electrical installations amongst the working-class, who were formerly users of gas only, and to a greater number of all-electric installations in the lower middle-class group. One point which always intrigues us in these tables is the statement that "gas appliances are primarily the concern of the housewife, and this is equally true of a proportion of electrical appliances, but in this field there are also large numbers of items which are more specifically the concern of the householder." We wonder what is the reason behind any sex difference in purchasing practice of the two forms of appliance, if, indeed, such a variation exists; it seems a fertile field of investigation by the E.A.W.

RURAL COSTS

WHILE the importance of rural electrification has almost become a byword, it is only the supply engineer who is fully familiar with the economic difficulties involved in any large scale development. There is consequently a danger that the issue may be made a political one and the B.E.A. left to face, by itself, a tangle of uneconomic lines. It is, therefore, worth collating evidence of costs of rural supply and that is why we draw attention to the 1950 results of the Eire Electricity Board. With £2¼ million already expended on their rural electrification scheme, the revenue has been less than 9% of this figure. No doubt this amount will increase in future years, but it is so patently low as to show the completely uneconomic nature of this development. And even this revenue was obtained with an average price per unit sold of 3½d.

Perhaps more expressive, is the Board's view based on this experience, that even a subsidy of one half of the capital will not be sufficient to make the electrification scheme self supporting. Not all rural areas are alike, nor will similar economic conditions apply in all cases in this country, but it is clear that even if the less uneconomic marginal areas are developed under present conditions, there is a very real financial barrier to the fullest rural development and those who speak so bravely on the public platform of electrical rural development, should first make sure they have an answer to such cold, hard facts as those given above.

OFFICIAL DESTANDARDISATION

THE revocation of the Control of Turbo-Alternators Order from August 1 is no more than *de jure* recognition of a *de facto* position. The original Order was made in November, 1947, and introduced the novel feature of retrospective standardisation, for it required all generating sets ordered subsequent to November, 1946, to conform with specified ratings and steam conditions, unless an exempting certificate was obtained from the Ministry of Supply. It had, however, a short effective life. With the setting up of the B.E.A. five months later, they were obviously better able to judge the merits or otherwise of standardisation, and when the Central Authority took over the progressing of new generating plant from the Ministry of Supply last year, the Order was obviously something more than redundant. It should have been scrapped long ago, for one of the merits of nationalisation is that such orders should not be necessary.

ARTS AND INDUSTRY

ONCE more examination-result-time is with us, and we are seeing again on the faces of our younger friends the self-satisfied look of the intellectual with the first, the more modest grin of the man who has "just made it," and the set expression of those for whom the lists have less pleasant news. Doubtlessly the engineers and scientists among those graduates will successfully pass to their apprenticeships, pupilages and research positions: but what of those who have studied on the Arts side, and wish to make their career in industry? There were some cogent comments on the usefulness of such university graduates during the recent F.B.I. conference on "Industry and the Universities," and among the suggestions put forward was that the newly fledged B.A. could act as a personal assistant to a senior engineer. In this position he would relieve the technologist of much marginal administrative work, while at the same time learning something of an industry in which he himself might later pass to executive rank in some non-technical capacity. With the still growing complexity of manufacturing methods and a continued shortage of scientists and engineers the idea merits a serious trial, and its degree of success, where it is adopted, will be watched with interest.

DOMESTIC INTERLUDE

IT is not often that Meteor's domestic affairs intrude themselves in this column, but after discussing with some friends, the Minister of Fuel's recent reference to storage radiators, every encouragement was received to do so, in order to demonstrate in simple manner a plea that has been constantly urged in these notes. The whole affair centres round the purchase of a thermostatically-controlled oil-filled electric heater for the hall. Financially this was an unwise step, for on this radiator the purchase tax alone was sufficient to pay for two ordinary electric fires, one of which would be adequate, if less convenient, for the job. Neither does the B.E.A. give any encouragement for long-hour usage which, although providing more equable heating, is likely to be somewhat heavier in consumption than the switching on of a fire when it is needed. We shall not iterate our arguments on this score, but it seems futile for the Minister to reveal such vistas of high load factor appliances with prospects of new outstanding developments when such equipment lies ready to hand, but is barred by the artificial weighting of scales against it.

Meteor

Dual-Pressure Boilers

Novel use of Velox units to boost steam supply in Australian Power Station

LOAD increases of 1·75 MW/minute on a 325 MW station inevitably call for careful operation, and when coal quality is so poor as to impair the performance of the available p.f. fired boiler capacity, the steam-raising problem associated with these conditions becomes extremely serious. At the Bunnerong station of the Sydney County Council electricity undertaking, the solution adopted has been the installation of two large Velox type boilers to reinforce the plant available. With their forced circulation of exhaust gases, and their high rates of heat transfer, these units are well suited for this duty.

Existing Conditions

To appreciate the magnitude of the problem that had to be overcome at Bunnerong, the plant which existed before the installation of the new boiler must be considered. Seven 25 MW, 1,500 r.p.m. Metropolitan-Vickers turbo-alternators generate power in Section A of the station, and these are supplied by 18 Babcock and Wilcox stoker-fired boilers, each having an m.c.r. of 120k lb/hr, and operating at 350 lb/sq in., 750° F. Section B of the station has three 50 MW Parsons 3,000 r.p.m. machines which draw steam from four 350k lb/hr p.f. fired boilers operating at 650 lb/sq in., 850° F. In addition, extensions are in progress to give another 50 MW in Section B (a Parsons set again), and to supply this, two Simon-Carves 300k lb/hr, 650 lb/sq in., 850° F. p.f. fired boilers are being installed, and this whole extension is programmed for commissioning during 1952.

This plant was, and is, among the most efficient p.f. stations in the Metropolitan area of Sydney, and so naturally takes a high proportion of the daily load. Poor quality coal has led to the deterioration of boiler plant, and the heavy demand leads to difficulties in carrying out regular and adequate maintenance on the furnaces and auxiliaries. With these objects in mind, the possibility of obtaining Velox boilers at short delivery was investigated, the idea being that they should supply steam to either the A or B section of the plant, as the existing shortage of steam capacity demanded. Early in 1948 an order for two 165k lb/hr boilers was placed with the Brown Boveri Company, and early last month the first unit was commissioned. The second boiler is expected to follow shortly.

Table I gives the conditions under which the boilers deliver their 165k lb/hr of steam, the fuel being Masut Bunker "C" grade, with a calorific value of about 9,700 kg cal/kg (17,400 B.Th.U./lb). The ash content of the fuel is under 0·1%.

Boiler efficiency guarantees are based on an ambient air temperature of 68° F and a feed water temperature of 212° F. At a continuous load of 25% maximum, the guaranteed efficiency is 87·3%, and for the 50, 75 and 100% steps it is 89·7, 90·6 and 91·0% respectively.

All the usual Velox boiler features are present, but rather unusual steam and water piping connections are necessary because of the dual operations required. Fig. 2 shows the general layout. Booster feed water pumps

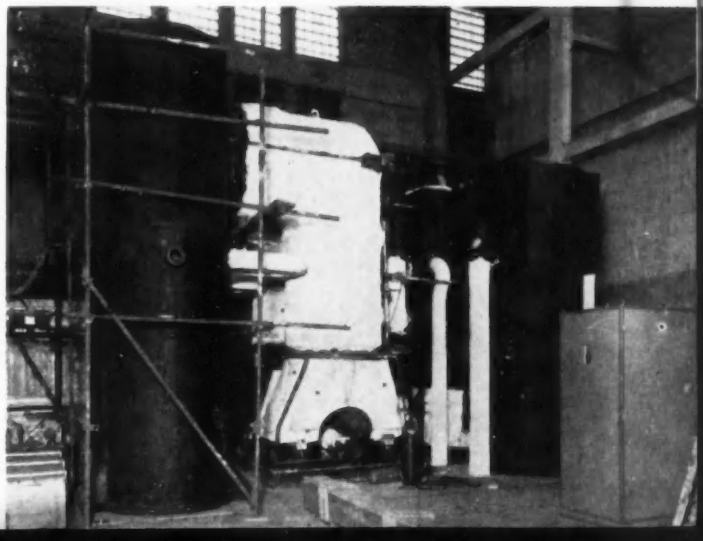


Fig. 1. This Velox unit at Bunnerong supplies steam at either 350 lb/sq in. or 650 lb/sq in. for the modern sections

have had to be employed because of the inadequacy of existing pipe line capacities, and also on account of the relatively high-pressure drop across the boilers (275 lb/sq in. for 750° F. operation, and 250 lb/sq in. for 850° F. service). The pumps used are of special design, and are unusual in so far as the stuffing boxes, balance pistons and leak-offs are concerned.

Most of the valves involved are electrically operated, their position being controlled from a mimic switchboard containing all the usual alarm and indication circuits. Various other control stations are provided so that emergency remote operation is possible. Those valves which are not electrically powered have their position shown on the mimic switchboard.

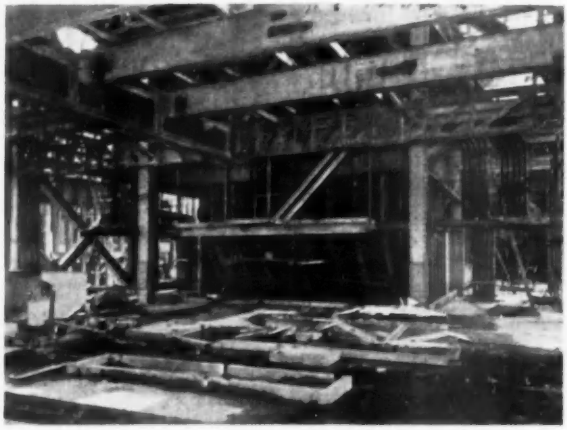


Fig. 3. (Right) Lower furnace tube-work of the International Combustion Ltd. 430k lb/hr boiler at Pyrmont

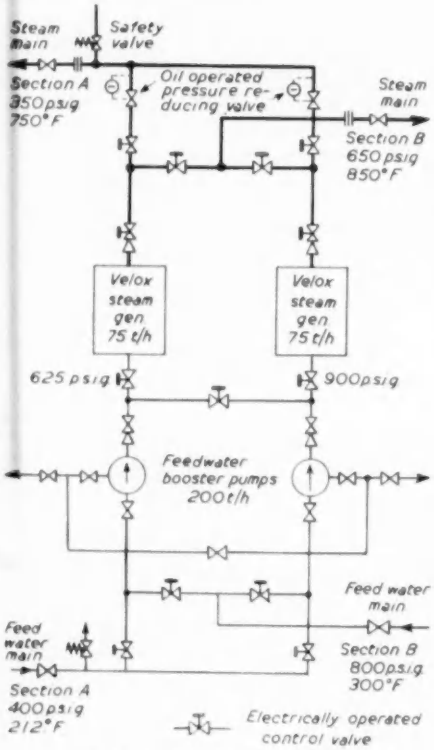


Fig. 2. Pipe and valve connections of the Velox boilers. Ratings are given in tons/hour

Electrical interlocking of the control valves is provided, the main consideration being the prevention of feedwater from one section of the station going through the boilers to the other section. The interlocking of the valves also ensures that the pumps operate singly, as designed, one unit being kept in reserve.

Oil-operated pressure reducing valves serve to protect the turbines of Section A should, for any reason, Section B steam conditions be switched over. It would appear that this could only occur through direct connection of the two steam mains or through sending Section B feed water to Section A. Both these possibilities are protected against by the interlocking circuits, and so the reducing valves effectively act as "back-up" protection.

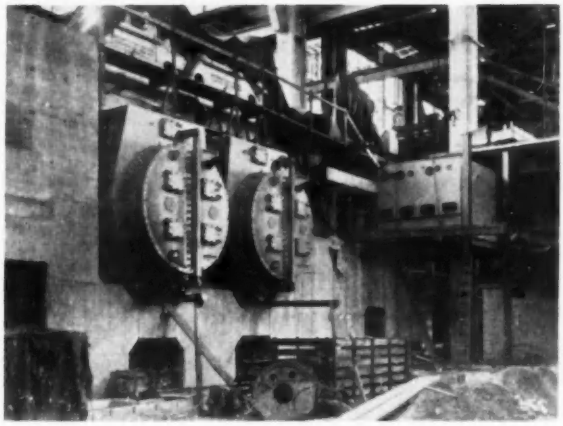
Operation of the boilers at the required conditions is obtained by pre-setting these requirements on the automatic regulating organs, the small pneumatic relays fitted to control mechanical operation. Only simple adjustments are necessary, and those not very frequently. The pressure drop from no load to full load is readily adjusted between zero and 15%, so that the desired proportion of load can be taken into service according to the fluctuating load demands.

Pipe Lines

Steam pipes running from the Velox boilers to Sections A and B of the station are made from a Siemens-Martin open hearth steel, and in size range up to 15 in. o.d. by $\frac{9}{16}$ in. thick and 14 in. o.d. by 1 in. thick (steam mains to Sections A and B respectively), and $10\frac{3}{4}$ in. o.d. by $\frac{3}{4}$ in. thick and $9\frac{5}{8}$ in. o.d. by $\frac{3}{8}$ in. thick

(feed mains to Sections A and B). Most pipe joints have been electrically welded using Arcraft electrodes having a tensile strength of 28 tons/sq in., a minimum elongation of 16% and an Izod test value of 35 ft lb/minute. The welds were stressed relieved at 600/650° C. for an hour/inch of pipe wall thickness. Cooling at a controlled rate down to 300° C. completed this heat treatment.

Pipe bends are of the plain radius type, the method of bending being such as to limit the thinning of the pipe wall to a maximum 12½% of the original thickness. In the 350 lb/sq in. and 650 lb/sq in. steam mains a small vertical type header has been used to provide permanent anchor points and to facilitate the joining of more than two pipe lines. An advantage of this scheme is that the calculation of the stresses in the pipe line is facilitated, while excess stresses due to vibration and abnormal conditions are minimised.



Other Extensions

Installation of Velox boilers at Bunnerong is only one of the steps being taken to improve the supply position in Sydney. Further extensions at Bunnerong have already been mentioned, and are shown in our photographs, while further illustrations give an impression of the progress being made with the Metropolitan-Vickers turbo-alternator and the International Combustion downward firing 1,250 lb/sq in., 950° F. boiler at Pyrmont "B." The installation was described in the ELECTRICAL TIMES of February 17, 1949.

Table I. Steam and Feed Water Conditions

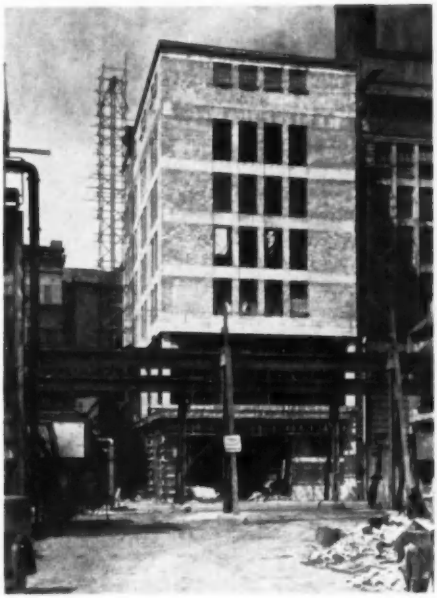
		Section A	Section B
Live steam pressure ...	lb/sq in.	650	350
Live steam temperature	° F.	850	750
Feed water temperature	° F.	300	200
Feed water pressure ...	lb/sq in.	900	625

Sydney Undertaking

This work has been planned and carried out by the Sydney County Council electricity undertaking but it will soon pass to the control of the Electricity Commission of New South Wales. This body is at present organising a senior engineering staff from within the service of the Sydney County Council and other electrical authorities in the area of its jurisdiction.

We are indebted to Mr. James F. Magee, Engineer Representative of the Sydney County Council electricity undertaking, for the information given in this article.

Fig. 4 on the left shows Metropolitan-Vickers condensers and turbines in course of erection at the Pyrmont station, while in the illustration below, Fig. 5, is shown the building which was added at Bunnerong to house the two Velox boilers



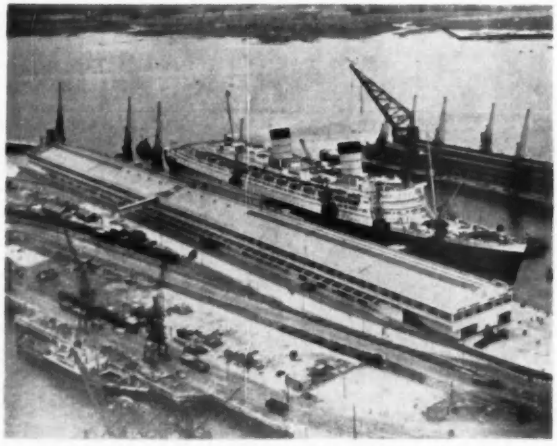
The Ocean Terminal

British Railways' new Atlantic Reception Centre at Southampton applies electricity to assure overseas visitors of a speedy clearance

OFFICIALLY opened on Monday of last week by the Prime Minister, the new Ocean Terminal buildings at Southampton Docks provide fitting passenger accommodation for the world's two most famous ships, and cannot fail to make a favourable impression on visitors from overseas.

With an overall length of 1,272 ft 6 in. (excluding the semi-circular feature at the south end), the building is in two storeys, passengers disembarking by means of tubular telescopic gangways at first-floor level where waiting rooms and Customs halls are situated, then being conveyed by escalators to boat trains at ground level. There is a sightseers' gallery on the roof.

The six telescopic gangways (ELECTRICAL TIMES, Feb. 23, 1950, p. 296) are fabricated in aluminium alloy. There are three turret units with twin revolving sponsons, each unit carrying two telescopic gangways. Rotation of the sponsons and elevation and depression of the gangways themselves are by electro-hydraulic means, the controls being automatically cut off when the weight is taken by the ship, so that the gangways are free to follow the ship's movement.



R.M.S. Queen Elizabeth alongside Ocean Terminal

Power Supply

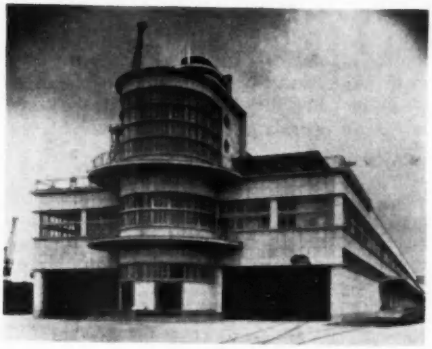
A transformer substation, containing two 500 kVA and one 250 kVA transformer (with space for a future 500 kVA unit), forms part of a composite building giving access to the sightseers' balcony, and is fed with 3-core 0·06 sq in. p.i.l.c. cables from two alternative 6·6 kV supplies. The e.h.t. compartment contains an Allen West Type 04B six-panel switchboard, with two incoming feeders, three transformer feeders and a spare unit, the rupturing capacity being 150 MVA.

The transformers, of English Electric manufacture, are standard indoor pattern o.i.s.c. 6,600/415 V. Separately housed, they feed the low-voltage switchboard in the third compartment, which contains an eight-unit Allen West vertical isolation metalclad switchboard having a rupturing capacity of 25 MVA, and arranged with a bus section switch so that the lighting load can normally be kept independent of the power load to avoid voltage fluctuation.

From the substation, feeders run to four Allen West independent circuit-breakers in the switchroom of the main building, two of which feed the first-class and cabin-class accommodation, by Statter switchboards with 1,000 amp incoming units, 800 amp heating feeders and switch-fuses for the lighting circuits. The third breaker feeds the ground floor lighting and heating via an English Electric h.r.c. fuse distribution board, while the fourth controls the ring mains feeding the power circuits via four English Electric h.r.c. fuse distribution boards, the gangway being fed by Weekes 60 amp ground connection boxes set at 40 ft spacing.

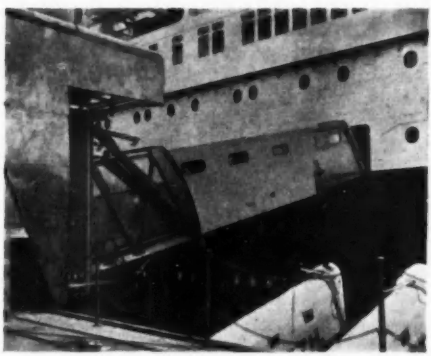
Transportation

Four reversible passenger escalators by J. and E. Hall are provided, two being installed on the railway platforms, the others being at



First sight of the Terminal for arriving visitors

the extreme ends of the building for passengers arriving or departing in cars. The escalators will deal with 4,000 passengers an hour and are powered by L.D.C. 16 h.p. slip ring motors through David Brown reduction gears. The escalators, manufactured by Messrs. J. and E. Hall, Ltd., are nominally 3 ft wide, with a 30° slope, and are designed for a 17-ft vertical rise in the case of the railway platform units, and 21 ft in the case of the road passenger units. They are intended primarily for passengers with light hand baggage. The design of the escalators incorporates special features to ensure the maximum smoothness of operation, combined with the greatest degree of silence.



Telescopic gangway in position with luggage gangway below

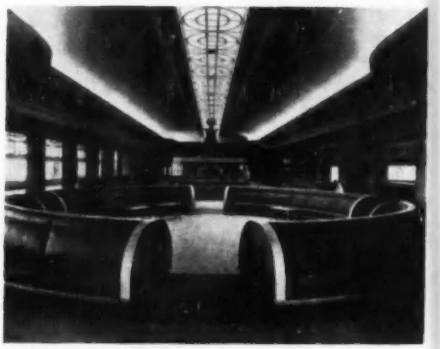
Threshold lights are provided to illuminate the step comb-plates at each end of the escalators for the convenience of passengers.

In addition to the escalators, there are 20 combined goods and passenger lifts of 30 cwt capacity, manufactured by Hammond and Champness, with Bull two-speed tandem motors, and Pliotron induction balance levelling gear. A separate lift is provided, for Customs and Waterguard personnel, which communicates with the bonded store room on the second floor.

Heavy baggage is handled by four inclined conveyors of the wooden slat type, by Sovex Ltd., run at 70 ft/min., powered by 10 h.p. L.D.C. squirrel-cage motors through David Brown reduction gearing and Vulcan Sinclair hydraulic couplings.

Lighting

Independent consideration has been given to the separate sections, on account of the different problems involved. For the ground floor direct tungsten lighting is used for the main area, using 300-watt lamps in dispersive vitreous reflectors at 20 ft spacing, giving an average intensity of 4 l./s.f. at floor level. Additional lighting over the east side rail platform at only 11 ft mounting height is given by 200-watt R.L.M. dispersive reflectors inset into the cantilever beams and closed with clear glass. For loading of box wagons on the west side,



View of 1st class and tourists' lounge

300-watt angle-elliptical fittings are used at 12 ft above floor level. The total number of main lighting points on the ground floor is approx. 400, and the load 115 kW.

Mazda fluorescent lighting fittings are used in the main Customs halls, using 5 ft 80-watt tubes in vitreous enamelled reflectors mounted directly on to the roof, the mounting height being 12 ft at the eaves and 25 ft at the apex. More than 600 fittings are installed in these two halls, the maximum illumination, 17 l./s.f.being along the lines of the Customs benches.

B.T.H. lighting in the customs examination shed

In the first floor waiting halls, indirect lighting is used, consisting of cold cathode lamps in two lines of white and one of amber, each line consisting of 8 ft 6 in. tubes overlapped at the ends, concealed in the cornices. Designed for an intensity of 7·5 l./s.f., the installation uses 4,500 tubes, the loading being more than 200 kW.

Sightseers' enclosure, the approach bridge, and corridor lighting are by Simplex, and bulkhead fittings. External floodlighting is by means of Simplex scuttle-type reflector fittings using 200-watt lamps. The baggage room lighting is by Simplex dispersive reflectors.

Wiring throughout is in solid drawn galvanised conduit. All fuses above 100 amp capacity are English Electric H.R.C., and below 100 amp are Siemens "Z" type.

Heating

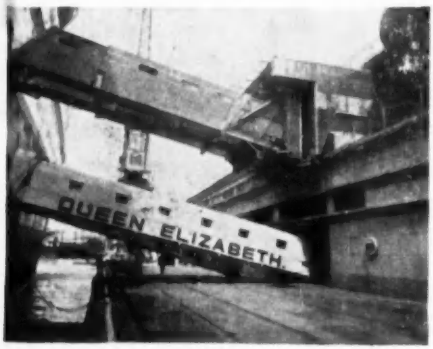
The cargo working area and the customs halls are not heated, but office accommodation and waiting halls are heated electrically. The waiting-hall heating is combined with the ventilating system by means of heater banks in the main ventilating trunking. Thermostat control is used, and delay relays are provided so that the heater banks are switched in progressively and not simultaneously. The control gear is d.c. operated by a metal rectifier. At the control panels in the switchrooms a small hand-operated switch gives master "on-off" control to the central circuit of each heater bank; a pilot lamp is provided for each contactor control so that an operator can see at a glance the state of switching given by each thermostat point.

In addition to these controls excess temperature-operated fusible links are provided in each heater bank so that should the main fan motor fail whilst the heater banks are switched on, the heaters will not burn out.

The main impeller fans and heating banks are located in rooms adjacent to the first floor switch rooms, a number of smaller heater banks being situated in various positions in the ventilating trunking in the roof space. Fusible link protection is provided in each heater bank to prevent burn-outs in case of fan failure. Exhaust fans are provided spaced along the roof. Total loading for the waiting halls is 733 kW, and fan loading about 25 h.p.

Customs offices and others are heated by direct wall-type convectors and standard tubular heaters.

Close-up of the telescopic type gangways



Public Address

As might be expected in a building of this size, an elaborate public address system is installed, giving facilities for relaying of verbal announcements, radio programmes, gramophone records, over any desired combination of eight different circuits comprising first-class waiting hall, cabin class waiting hall, two railway platform circuits, each consisting of 16 speakers; cargo working area; sightseers' enclosure, and two circuits of outdoor speakers for car parks and taxis. Equipment was supplied by Ardente Ltd., and more than 90 loudspeakers are installed.

LIST OF CONTRACTORS

Switchgear: Allen West and Co. Ltd., and J. G. Statter and Co. Ltd.

Transformers: English Electric Co. Ltd.

Lifts: Hammond and Champness Co. Ltd.

Escalators: J. and E. Hall Ltd.

Baggage Conveyors: Sovex Ltd.

Lighting: British Thomson-Houston Co. Ltd.; Phoenix Electrical Co. (London) Ltd.; Simplex Electric Co. Ltd.; Thorn Electrical Industries Ltd.

Heating: Viaduct Heating and Ventilating Co. Ltd.

Illuminated Direction Signs: Straight-Lite Reflectors Ltd.

Passenger Gangways: Structural and Mechanical Development Engineers Ltd.

Training the Electrician

A Scheme Suitable for the Medium-sized Works

IN many an industrial concern there is a desire to give a good apprenticeship training to lads employed in the electrical maintenance department, and yet the organisation and size of the firm is such that this cannot be readily achieved. A simple expedient is to leave the apprentice to learn practical details of his trade during the day, and to assist him to acquire his technical knowledge by evening or part-time day attendance at a local technical college. An obvious disadvantage exists in this system, however—it does not tie-up the practical and theoretical instruction, and does relatively little to identify the electrician with the firm in which he trained.

An effective compromise between this system and the more complicated training schemes which are possible only in very large concerns has been evolved by Caldwell's Paper Mill Co., Ltd., of Inverkeithing, Fife, which is engaged in the production of high-grade writing papers. Lads between the ages of 14 and 16 are accepted for a five-year apprenticeship with the electrical department of this firm, and during their training are placed under the charge of the works electrical engineer.

As a background to a description of the scheme, some knowledge of the installation which is maintained is required. The machinery is of the usual paper mill type, with works generation at 440 V a.c. at present. Some 550 motors are used in the various processes, ranging from ¼ h.p. up to 450 h.p., about half of these being slip-ring induction type machines. There are five paper-making machines, in connection with which 60 to 100 motors are essential to the continuous production process: the outage of any one of these units would cause the paper on the associated machine to break.

First Year

When he joins the firm, the apprentice is placed under a time-served electrician, but he spends his first twelve months of training in the electrical shop and stores. This has the advantage of familiarising him with the equipment and plant used in the works, and of allowing him to acquire the "feel" of his trade. At the same time he starts his evening class studies, working either for ordinary National Certificate or the City and Guilds diploma. Willingness to attend evening classes for this purpose is a condition of employment as an apprentice, and, if necessary, time off from work is allowed to facilitate attendance.

At the end of his first year the apprentice begins work under a skilled man and also starts his studies for the written examinations, which lead to the firm's apprenticeship diploma. To aid him in this he is issued with two reference books, *Spon's Electrical Pocket Book* and *Power Wiring Diagrams* (Dover), and begins tuition under the works electrical engineer.

Apprenticeship exam

The apprenticeship examinations for which the student works are simple in idea—he has, in the course of a two-hour period, to answer twelve questions. These questions are set out in a list given him at the start of his second year of training, and the answers, where they are not included in his text books, are given in another list with which he is provided. Obviously such a test is no measure of the apprentice's general technical knowledge: the task of finding that is left to the technical college. What is attempted in these questions is the inculcation of sound methods of carrying out fairly common technical jobs, and the teaching of the circuits, symbology and definitions necessary for everyday work. An examination is held every quarter: at every examination the student has twelve questions to deal with, so at the end of three years of study for the apprenticeship diploma 144 questions have been dealt with.

At the end of his third year at work the apprentice has completed his compulsory evening class studies; at the end of the fourth year he has answered his 144 questions, and his theoretical training is over, unless he accepts the encouragement to continue which is offered to him. Between the ages of 18 and 19, and not until then, he is started on live work, and during his final years is sent out on lighting troubles, fault finding and small installation jobs.

At the end of his apprenticeship he should have a sound knowledge of his trade, acquired while serving his firm in a useful capacity, and th t without a big diversion of energy to the t..sk of dealing with him.

Our readers' views . . .

Fused Plugs

IN your issue of July 27, a correspondent suggests that in a matter of a few years, it may be impossible to obtain spare fuses for the fuse plugs now largely in use.

It should be pointed out that when first sold, each fused plug necessarily contains one fuse, but as time goes on, most fused plugs require a spare fuse, so that in due course, the sale of spare fuses must necessarily exceed the number of plugs in use by a considerable margin.

It is therefore unthinkable that the manufacturers of such fuses would cease to manufacture them.

Chas. M. Nesbitt

D.S. PLUGS, LTD.

◆ ◆ ◆

Incentives in the Wiring Industry

IN answer to Mr. Gilbert (July 20), I would like to say that I consider the whole idea of incentives as a negative approach to the problem of increased production. The trouble, I am afraid, lies in human nature as it is today. If everyone did a fair day's work and received a fair wage there would be no need for incentives. But alas! this is not so, therefore we have—for certain workers—bonus schemes and the like.

In my own experience, electrical installations should be carried out at what I will call—for want of a better phrase—"cruising speed." I have found that any tendency to speed up electrical installation has resulted in the quality of the work suffering.

Wires twisted in a sloppy manner, one screw where there should be two, loose connection screws, crooked accessories, and—worst of all—loose earth clips, are a few of the results of speed. The sum total is the lowering of that *all important* factor in electrical installations—*safety*.

I cannot reply to all Mr. Gilbert's points in a letter, but I will comment on those that interested me most.

He says that steel conduit covering T.R.S. is a "doubtful addition." I will only say that I have never been happy using the usual light-gauge conduit for this purpose, and it is my firm belief that heavy-gauge conduit (or channel) should be compulsory. I base this view on the experience of many electricians who have met the hapless householder who said: "I was just knocking a nail in to hang a picture, when . . .!" Again, in his defence of single-strand cables, we have to consider conditions as they are, and here again human nature is the salient factor. 1·044 is the only single-strand cable I have ever used, and I—along with others—have often seen a 1,000 W, and even 2,000 W radiator plugged into a light point. Half an amp, indeed!

I would like to comment on the pre-fabricated systems I have reluctantly installed, but I am afraid my remarks would never get past the editor's desk!

J. Wilkins

BLACKBURN

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School Lighting Economics

DELAY in replying to Mr. Sawyer's comment (July 13) has enabled me to deal with Mr. Gaughan's criticisms of August 3 at the same time.

My figure of 50-100 hours cannot be "wide of the mark" insomuch that it is based on many actual examples of metered consumption and, in any case, is quoted as a minimum "often as low as," and the general statement in respect of the economic introduction of fluorescent lighting holds good up to at least 200 hours per annum. Apart from my own experience, allow me to quote from a special study of schools load made by the Central Electricity Board, June, 1937, when average daylight factors were lower than present practice. Details of the consumption in units per annum for each kilowatt installed, i.e. hours of use, were given, averaged over two or three years, for 61 schools of various types, and no less than 31 showed lower than 100 hours per annum. As many senior schools with evening classes fall far short of 450 hours averaged over all teaching rooms, I cannot appreciate Mr. Gaughan's 450 hours for primary schools, particularly as few, if any, are ever used in the evening, the lack of adult-sized furniture being an obvious reason.

In modern design a greater minimum daylight factor (and, incidentally, a lower maximum, thus flattening the curve) is aimed at, resulting in a decrease in the use of artificial

lighting. Ignoring the old-fashioned, ill-lighted schools of 40 or 50 years ago, which are condemned anyhow, the N.P.L. daylight factor of 1·5 quoted by Mr. Sawyer only applies to a small portion remote from the windows.

I have crusaded for better lighting in schools for 20 years against considerable opposition from responsible committees and executives, who still often fail to appreciate the need for the expense, despite the fact that the Ministry of Education's minimum of 10 lumens per square foot is a regulation, not merely a recommendation, as formerly issued by the old Board of Education. Carry on still further the excellent work of your organisation, Mr. Sawyer, as I can assure you of the need for a greater flood of propaganda to swill out the prejudice still existing in provincial backwaters against the necessity and, unfortunately, the cost of good lighting.

In respect of disability glare, I stated that "tubes can be tolerated without disability glare, etc.," not, as quoted by Mr. Sawyer, "disability glare can be tolerated," as this is obviously incorrect. Both disability and discomfort glare are surely subject to degree, bearing from the slight and tolerable, to the maximum and intolerable, and I must reiterate that at all angles of more than 30°, etc., the glare from the naked 5 ft tube is generally considered low enough to be tolerated, particularly where there is need of the greatest possible economy, which, after all, was the keynote of my article.

Finally, Mr. Gaughan has failed either to read my article carefully, or to appreciate that the coefficient of utilisation varies with the height of suspension. The opal spheres "C" and "D" are shown suspended from the ceiling, presumably at a normal height of 9 ft from the floor, i.e. 6 ft to 6 ft 6 in. above the working plane, ranking for Room Index "E" and C. of U. under the best possible conditions of 0·41. Example "E" deals with "Seagull" type of 5 ft tube fitting fixed *on the ceiling*, the height of which varies in classrooms from 11 ft 6 in. to 14 ft, giving a height above the working plane of 9 ft to 11 ft 6 in., an applicable Room Index of "C-B" and a C. of U. of 0·42-0·38, hence my figure of 0·4.

F. J. Farmer
ASSOC. I.E.E.

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Boiler Interconnection

I MUST point out a misunderstanding of my World Power Conference statement printed on page 101 of the ELECTRICAL TIMES of July 20. My opinion was that interconnection of unit boilers is worthwhile if the forced outage availability factors are 0·1 for boilers and 0·05 for turbines. I send you for further explanation my whole statement.

J. Ricard
PARIS 8

[*Unfortunately we are unable to include, for reasons of space, M. Ricard's full discussion of the problem.*—ED.]

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Public or Private?

HAVING recently returned from abroad I would like to reply to the letter from Mr. Philip Honey of the E.D.A. which appeared in your issue of April 6, and which concerned my article "Industrial Power—Public or Private?" (ELECTRICAL TIMES, March 16, 1950).

Firstly, my remarks about low thermal efficiency apply to any condensing steam station (whether coal or oil fired) supplying a large transmission system. In 1949 the average overall thermal efficiency of coal burning "grid" power stations in this country was 21/15%, and taking transmission losses into account the overall thermal efficiency referred to consumer's terminals was 19%. Thus 81% of the available heat units were wasted.

On the other hand, a typical industrial diesel station has an overall thermal efficiency of 30% (neglecting waste heat considerations), and where large supercharged engines are employed it is not difficult to improve considerably on this; there are no associated transmission losses.

Secondly, I would refer to the Minister of Fuel and Power's speech at the E.D.A. dinner on April 27, 1950, when he stated that 65% of power station fuel supplies were of low grade fuel in 1949. On this reckoning nine million tons of high grade coal suitable either for carbonisation or export were destroyed by power stations in 1949, yielding no valuable by-products and 19% of the total heat energy. Small wonder the gas industry prospers!

The vast burden of B.E.A. capital charges and overheads is bound to lead to a rise in maximum demand rates in the near future, while the increase in railway freight charges will be reflected in an increase in the coal clause charge. (A recent estimate is that the cost per unit sold will increase by about 12%, and few engineers will doubt this.) It appears that the industrial consumer is expected to bear the brunt of higher all-round running

costs in addition to subsidising the capital and overhead charges involved in the provision of plant to meet the needs of domestic consumers.

The B.E.A. accounts for 1948/49 reveal that whereas average revenue obtained (per unit sold) was 12·6% *above* the 1938/39 figure, the revenue obtained for lighting, cooking and heating only was 9% *below* the average for 1938/39. This shows quite clearly how the position of the industrial consumer has worsened over the last ten years compared to that of his domestic opposite number. Moreover, there is no sign of any modification of tariff policy in favour of the industrial consumer being envisaged for the future.

There are, of course, numerous examples of independent plant (both steam and diesel) already being employed to economic advantage (the arrival of the commercial gas turbine generator has stimulated interest in local generation as opposed to an extension of the "super-station" and "grid" idea), and altogether it does seem that a more critical attitude on the part of the industrialist is to be anticipated and will do much to remove complacency towards the tariff pattern and local generation.

There is an optimum size for most human enterprises at which they operate with maximum efficiency, and this dictum applies equally to the electrical supply industry. Recent suggestions that "private generation" and "local generation" are dead and can be consigned to the history books will not be borne out over the next decade even in this country.

It is surely significant that, while the small independent diesel station is seen to greatest advantage in a large industrially undeveloped territory (e.g. the Soviet Union and Australia), where distances between townships rule electrical transmission out of court, it is in a position to compete with a centralised power system in a highly developed, congested area like Great Britain.

D. Woodfall

HYTHE, KENT

British Association Programmes

TWO hundred and seventy-three lecturers of international reputation in their fields, will be speaking during the sessions of the 112th annual meeting of the British Association for the advancement of science, which is to be held in Birmingham from August 30 to September 6. Although there is no set theme for this year's meeting, "Energy in the Service of Man" has been suggested by UNESCO for world-wide discussion and study during 1950, and this has been kept in mind in arranging the lectures and discussions. Sir Harold Hartley's presidential address on "Man's Use of Energy" will bear directly on this point.

Chairman of Section G, Engineering, is Professor Andrew Robinson, F.R.S., who in his address will deal with bridge engineering. Of more direct interest to electrical engineers will be Professor A. Tustin, who is to discuss progress in automatic control systems. At another session, Professor O. A. Saunders, Dr. A. T. Bowden and Dr. J. S. Clarke will deal with gas turbine progress, the last two having stationary machines and combustion, respectively, as their subjects.

The manufacturing side of the industry should appreciate the session on production engineering, which is to be opened by Professor T. U. Matthew with a general discussion of the problem. Further speakers will consider flow line production, work measurement research and the management approach to productivity. For the supply engineer there may well be information of importance in a three-paper session on agricultural engineering.

Physics

Five papers will be delivered at a session on high energy particles and machines for their acceleration, and in this three of these will discuss experience with such machines. At another session nuclear energy will be dealt with, the civil applications of this power source being the general theme. Illuminating engineering seems to have strayed into this section, for there are a series of papers on the lighting of picture galleries and museums and on airport lighting.

Common to the physical and engineering sections of the Association is a session on the presentation of technical information. That well-known expert on the subject, Professor R. O. Kapp, will contribute a general survey, while other speakers will deal with the need for clearer circuit diagrams, the technical author and his publisher, a psychologist's view of the problem, and the administrative view.

Problems and Practice

IN ENGINEERING

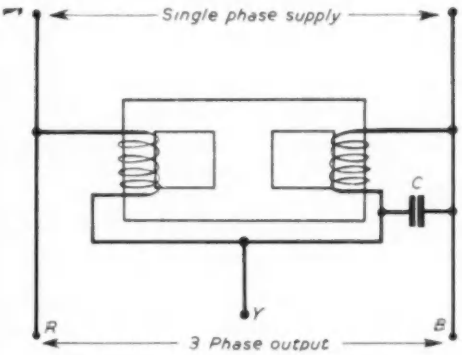
Wrong Phase

AN unusual fault was investigated recently, the complaint being that one motor stopped when another motor was started, but if the starting sequence was reversed all was in order.

The installation consisted of a group of 3-phase motors fed from a static phase converter, the site being in a non-industrial area with only single-phase supply available. The no-load setting of the convertor was in accordance with makers' instructions, namely:—

R to Y phase 330 } Using
Y to B ,, 495 } rectifier type
R to B ,, 400 } voltmeter.

These adjustments gave a good balance under normal working conditions, but the motor in question which caused the other to stop was the largest of the group. It was controlled by a direct-to-line starter and had to start against the load of an appreciably heavy flywheel. The effect of starting this motor was to throw the two phases, RY and YB, off

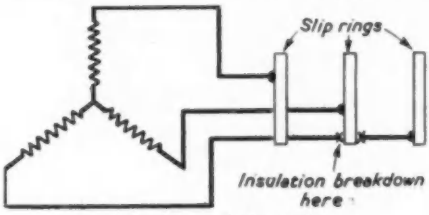


Schematic diagram of the phase convertor in use for motor supplies

balance until it speeded up. The no-volt coils of the starters were connected across RB phase (solidly connected to the single-phase supply) except in the case of the starter of the motor which was stopping. This was found to be erroneously connected with its coil across RY phase. It was promptly changed to the correct phase, RB, and no further trouble was experienced.—*S. Arnold.*

Slip-ring Insulation

STARTING trouble was experienced on a 120 h.p. 3-phase 400 V wound rotor a.c. motor. The report was that when the stator oil circuit breaker was closed for starting, a heavy load was indicated on the ammeter, accompanied by a "rumbling" in the motor.



Slip ring insulation faults

The main line fuses, the oil circuit breaker and the rotor resistance controller were checked. An insulation test to earth was carried out on both rotor and stator, but no fault was indicated.

A rotor circuit fault was suspected and a careful inspection of the slip rings revealed signs of burning where the brass rod supplying the inner ring passes through the middle ring. When this rod was removed it was found that the insulation had broken down, resulting in the rod fusing to the slip ring. A temporary repair was made by filing off the burnt and fused metal from ring and rod, and insulating with a good quality tape.

From the above it will be seen that two of the rotor windings were connected together permanently, which gave rise to the excessive starting current.

A more frequent inspection of the slip ring assembly and removal of carbon dust is to be carried out.—*R.H.B.*

Shocking Water

INVESTIGATING the causes of shock sometimes proves to be very interesting, as the following experience shows. The consumer had reported that shocks were received from the hot and cold water taps. Tests proved that the electric iron had developed an earth fault.

The earthing system of the installation was found to be defective, and became alive during the period the iron was in use. The water taps

were found to be at earth potential, therefore if shocks had been received, the water must have become alive.

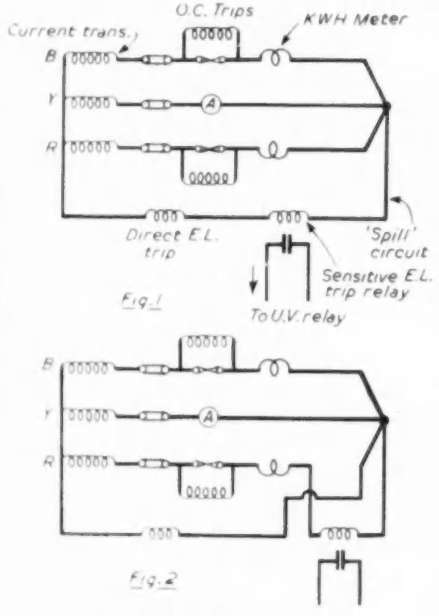
This proved to be the case, and the sequence of events was as follows. The earthing system was in contact with a dead gas pipe, an elbow projected from the kitchen wall. The consumer's wash boiler was in contact with the elbow and the waste pipe of the sink. When the column of water from the taps came into contact with the sink a difference of potential existed between the water and the taps.—*J. Wilkins, Installation Inspector, L.E.B.*

Earth Leakage Connection

A NEW 3,000 V truck-type switch tripped on earth leakage when first put into commission. The switch controlled a large 3,000-V excavator which was being put to work in a new quarry. This had entailed moving a considerable length of h.t. cable with several coupling boxes. Although this had been tested for insulation resistance before putting into commission, the first conclusion was that a coupling box had broken down to earth because of rough handling. A complete routine statutory test of the cable and excavator, however, failed to indicate a fault. A fault in the switch had, for the time being, been ruled out, since it was brand new and was the product of very reputable manufacturers of switchgear.

In the light of tests, however, the switch was suspected, and a thorough check of the earth leakage system was made. This disclosed incorrect internal connections. Figure 1 is a schematic diagram of the current system of the switch, showing the correct connections. With this system of earth leakage protection, a current flows in the "spill" circuit, and therefore the earth leakage trip coils when a fault occurs between a phase and neutral, i.e. an earth fault. The incorrect connections are shown in Figure 2. It will be noted that the sensitive earth leakage trip coil is connected in series with the red phase current transformer, the result being that the switch tripped when quite small currents were flowing in the current transformer circuit.

The only satisfaction to offset several hours delay in production was that the earth leakage trip coil had been thoroughly tested!—*A. C.*



Earth leakage trip connections

Location of Earth Leakages on Low Voltage Networks

ON a number of occasions it becomes necessary to locate excessive earth leakage currents on low voltage network, the location of these can sometimes be a very tedious and trying affair.

In this particular case a fairly heavy leakage was recorded at a substation which supplied about 30 consumers, and as the network was overhead it was obvious that an installation was at fault. The services to all the houses were run with twin cable into service fuse units, and the method adopted to locate the installation with the fault was to put a "tong ammeter test" on the twin cables at each house in turn. The transformer was earthed on the l.v. side solidly to a metal water pipe and any earth leakage current would return by way of the earth path afforded it and through the water pipe. There would therefore be no reading on the tong ammeter when tested on a healthy service installation, but the full value of current passing through the earth path would be read on a faulty installation.

The fault was finally tied down to one house and by withdrawing the sub fuses until the tong-reading was "lost" the faulty sub circuit was located. The trouble was due to a water heater which was earthing to the tank. About 125% rated current was being passed by the heater, and it is doubtful if the element would have lasted much longer.—*K.G.W.*

Contributions to this page dealing with specific items of interest to electrical engineers and maintenance men are welcome, and, if accepted, will be paid for at our standard rates. Contributions should be written on one side of the paper only and may be accompanied by sketches, which will be re-drawn for publication.

A.C. CALCULATION BY VECTORS

—*Some Basic Considerations*

By G. W. STUBBINGS, B.Sc., A.M.I.E.E.

A COMPLEX number z can be expressed algebraically in three ways $z = x + jy$; $z = r(\cos\theta + j\sin\theta)$; and $z = re^{j\theta}$ where $r^2 = x^2 + y^2$, $\tan\theta = \frac{y}{x}$, θ being in radian measure, and $j^2 = -1$. Another symbolic shorthand method of representing z is r/θ. The first kind of expression is used for the addition of complex numbers; the x of the sum is the sum of the x's of the components, and so with the y's. The third or exponential

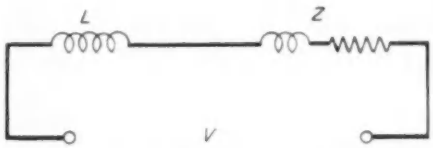


Fig. 1. Schematic representation of a complex impedance

expression gives the rule for multiplication, the r of the product is the product of the r's of the factors, the θ of the product is the sum of the θ's of the factors. Symbolically, therefore, $z_1z_2 = (r_1\,\underline{/\theta_1}) \times (r_2\,\underline{/\theta_2}) = r_1r_2\,\underline{/\theta_1+\theta_2}$. Complex numbers can be illustrated in the well-known way, by directed steps or geometrical vectors; $z = r(\cos\theta + j\sin\theta)$ is illustrated by a line of length r at an angle θ to a reference direction. But complex numbers are inherently pure numbers and not geometrical lines. The product of two complex numbers is not the product of the directed steps illustrating them.

Representation of Physical Quantities

Physical vector quantities like directed steps, velocities or forces, can be completely represented by a complex number and the statement of a unit. Thus $F = r(\cos\theta + j\sin\theta)$ lbs means a force of r lbs acting at an angle θ with a reference direction. Vector quantities of the same kind can be added or compounded by the rules of algebra, for the sum or resultant has the same dimensions as those of the components; displacements combine to produce a displacement, and forces combine to produce a resultant force. The multiplication of physical vector quantities is not so simple, because the dimensions of the product are different from those of the factors, and the multiplication of the complex numbers representing two vector quantities rarely gives any intelligible result. The product of two directed steps expressed as $r_1r_2\,\underline{/\theta_1 + \theta_2}$ is meaningless geometrically. So is the product $Fl\,\underline{/\theta}$ of a force F acting in a direction inclined at an angle θ to a displacement l. Two meanings can be assigned to the product of a force by a displacement, the one $Fl\cos\theta$ is a scalar product representing work, the other $Fl\sin\theta$ is a vector product representing torque. But these meanings do not follow from the algebraic rules for the multiplication of complex numbers.

Sinusoidally varying alternating quantities like current or voltage of the same frequency *f* can be added or combined as vectors. The vector of an alternating current of maximum value I is essentially a line rotating at a speed of $\omega = 2\pi f$ radians per second, for the projection of this line on a reference line gives the instantaneous value of the current. The vector can therefore be represented symbolically as $I\,\underline{/\omega t + \theta}$ where θ is the position of the vector at the zero of time. Consider two alternating currents represented by $I_1\,\underline{/\omega t + \theta_1}$, and $I_2\,\underline{/\omega t + \theta_2}$. Since the angles in these expressions have the properties of indices, the two vectors can be expressed $(1\,\underline{/\omega t}) \times (I_1\,\underline{/\theta_1})$ and $(1\,\underline{/\omega t}) \times (I_2\,\underline{/\theta_2})$. The common factor $1\,\underline{/\omega t}$ can be ignored, and the resultant of the two vectors obtained by combining or adding the stationary factors $I_1\,\underline{/\theta_1}$ and $I_2\,\underline{/\theta_2}$.

The rules of vector algebra cannot be applied

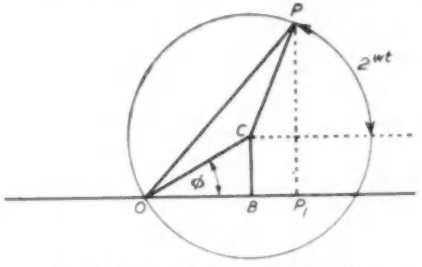


Fig. 2. Power as a geometrical vector

to the multiplication of alternating voltage and current vectors to obtain a.c. power. Consider a voltage vector $V_m\,\underline{/\omega t}$ and that of a current leading it by an angle ϕ or $I_m\,\underline{/\omega t + \phi}$. The product of these two vectors is $V_mI_m\,\underline{/2\omega t + \phi}$ which is a line of length V_mI_m rotating at the

double speed of 2ω radians per second. This represents an alternating quantity of frequency $2f$ and having zero average value, and it does not in any way represent the power value required in practice. We can obtain the average power value by the following artifice. Since $\cos\theta$ is always equal to $\cos(-\theta)$, it follows that the alternating voltage represented by the rotating vector $V_m \underline{/\omega t}$ will also be represented by the rotating vector $V_m \underline{/-\omega t}$ moving with the same speed but in the opposite sense, for the projections of these two rotating vectors on the reference line are always equal. If now we multiply the current vector $I_m \underline{/\omega t+\phi}$ by this second voltage vector $V_m \underline{/-\omega t}$ we obtain $V_m I_m \underline{/\phi}$. This is a stationary vector of length $V_m I_m$. The projection of this vector on the reference direction gives $V_m I_m \cos\phi = 2P$, where P is the average power. If the lengths of the rotating vectors are the r.m.s. values of current and voltage, then the length of the product vector is VI, the voltamperes, and the components of this vector are $P = VI\cos\phi$ and $VI\sin\phi$, the VAr. For this reason the vector $VI \underline{/\phi}$ is sometimes termed the vector power, its components $VI\cos\phi$ and $VI\sin\phi$ being termed the actual and the reactive power respectively.

Vector Products

It might appear from the foregoing that the product of the stationary factors of the vectors of current and voltage gives a quantity like $VI \underline{/\phi}$ of which the component $VI\cos\phi$ is the average power arising from the association of the current and voltage. This, however, is not the case, as can be seen from the following illustration. The circuit of Fig. 1 comprises a resistance-free inductance L and an impedance Z having a resistance R and a reactance X. The whole of the power from the source is absorbed in the impedance. The current in the circuit lags the supply voltage by some angle ϕ, and it can be represented symbolically by the stationary vector $I \underline{/-\phi}$. The voltage drop in Z has the magnitude IZ, and it leads the current by an angle θ. This drop can therefore be represented by $IZ \underline{/\theta-\phi}$. The product of the current and voltage drop vectors is $(I \underline{/-\phi}) \times IZ \underline{/\theta-\phi} = I^2Z \underline{/\theta-2\phi}$ but the projection of this vector on the reference direction, or $I^2Z\cos(\theta-2\phi)$ does not represent the average power taken from the supply. If, however, instead of multiplying the current vector by that of the voltage drop in the impedance $IZ \underline{/\theta-\phi}$ leading the supply voltage by the angle $\theta-\phi$, we multiply by what is called the conjugate vector, or that of a voltage lagging the voltage by the same angle and represented symbolically by $IZ \underline{/\phi-\theta}$ we obtain $(I \underline{/-\phi}) \times (IZ \underline{/\phi-\theta}) = I^2Z \underline{/-\theta}$ the projected part of which, $I^2Z\cos\theta = I^2R$, correctly represents the average value of the power dissipated in the impedance and taken from the supply. But this is mere subterfuge; it is altering the rules of vector algebra in order to obtain a result which, from trigonometrical considerations, we know to be the correct one.

Vector multiplication therefore only gives the oscillating part of a.c. power, and not the constant average part that counts in practice. This is, in part, because a vector product is a vector, whereas average power is essentially scalar and is devoid of vector properties. The rule for vector multiplication cannot be said to apply to alternating currents and voltages, and this is, in part, because these quantities are vectors only in a qualified sense; the angular part of an a.c. vector is not a geometrical angle, but is really a fractional part of a period of time interval.

Power Representation

Attempts have been made to represent a.c. power as a geometrical vector. One such representation is illustrated in Fig. 2. In the triangle OCB, OB, BC and OC are proportional in lengths to the average power, the VAr and the VA respectively. A circle is drawn with C as centre and OC as radius. As a radius of this circle CP rotates about C with an angular velocity of 2ω radians per second, the projection of the vector OP on the reference direction OB is proportional to the instantaneous power. But OP is not a vector like that of an alternating current or voltage; it is of varying length, it rotates at a varying speed, and it cannot be brought to rest by rotation of the axis of reference. The diagram is nothing more than a geometrical illustration of the trigonometrical formula for instantaneous power. Attempts to treat a.c. power as a vector, either by diagrammatic representation, or as the product of vector multiplication, seem to be ill-advised and confusing to the thinking student, and are best avoided.

Plant Engineers Course

PLANT engineers occupying executive positions in industry in the Nottingham area will, this winter, have the opportunity of attending a refresher course at the University of Nottingham. The course will consist of papers read by experts, and followed by intensive discussion, and commences in October.

The syllabus is designed not only to increase knowledge, but to make more effective use of existing knowledge; to promote the application of advanced techniques in works engineering practice over an extremely wide field. The subjects include: planned maintenance; lubrication; modern developments in mechanical transmission of power; mechanical handling plant; combusion and steam raising; steam utilisation; distribution and utilisation of electricity; properties and treatment of metals.

Fee for the full 23 weeks' course is £3 3s. Full details from Mr. P. Bailey, Ministry of Fuel and Power, Chalfont Drive, Nottingham.

Notes on Wiring
by MEGOHM

The Lack of Spares

Replacement parts unobtainable for repairs to accessories

A FRIEND of mine, engaged in another branch of the electrical industry, was deprecating the fact that it is very difficult to obtain spare parts for most electrical equipment and accessories, and in some instances virtually impossible. He drew a comparison between the service he could obtain from all dealers in motor or clock and watch accessories, and that to be expected from wiring specialists, and I am inclined to agree that we lag considerably behind in this respect.

If you purchase a car, the manufacturer issues a small booklet listing, with many illustrations to simplify the task of identification, practically every part of which it is composed. The most insignificant screw or washer is given a code number, and sometimes this number is actually marked on the part itself. So far as my experience goes, few electrical firms follow this practice, except perhaps for some of the larger stock items, and I think there is room for some improvement.

There are probably several reasons for this state of affairs, one being that most manufacturers list a multiplicity of small accessories, all serving a similar purpose, but differing in design or construction.

Damaged Socket-Outlets

My friend's gentle recriminations arose from the fact that he had recently moved into another house equipped with some eight or ten 15-amp socket-outlets, each combined with a switch. All were identical and of a first class make, consisting essentially of a porcelain interior enclosed in a moulded synthetic cover, part of which furnished the anchorage for the switch dolly mechanism. The burden of his lament was that every one of the covers was damaged, and as he had been unable to obtain replacements he was therefore faced with an expenditure of over five pounds for fitting complete new socket-outlets, which was really not necessary. With this view I agree. If manufacturers dispose of many thousands of components of this type, then it is only fair to the public that replacements should be readily available for those parts of the installation which are more vulnerable.

Mouldings and Castings

This contretemps led to a discussion on the merits and demerits of this type of moulded construction, and we came to the conclusion that there is still room for considerable improvement. I suppose it must be nearly twenty years ago since this material was first used to any considerable extent, but I have always hoped that something possessing more elasticity would eventually be evolved.

Admittedly some designers of synthetic resin mouldings do work on the above principles, but many others certainly do not. And the same remarks can equally be applied to another material which is rapidly gaining in popularity with our manufacturers, that is die-cast zinc alloys. In some respects the two are not dissimilar in mechanical characteristics, and I seem to detect a tendency towards their universal use in the not too distant future; one or the other being selected should one favour an all-insulated or an earthed system of wiring.

Better Quality Wanted

It may well be that part of the trouble is due to some form of ageing or secular change. I have had no opportunity of investigating the matter, nor do I recollect seeing any reports on this particular aspect.

From the practical point of view, we are all familiar with the many fractures that occur, the moulded shade-rings that defy our efforts to remove them, and the harsh and grating action that frequently is experienced where constant movement, as with a switch dolly, takes place.

It is not suggested that these materials do not serve a very useful purpose and have many applications. But it is suggested that their indiscriminate use is a retrograde step, and that designers should realise their limitations, and manufacturers should increase their efforts to improve the quality by reducing the present brittleness and, for some purposes, co-efficient of friction.

overseas news

Power Survey in Australia

A survey by the Ministry of National Development covering existing installed generating capacity, plant under construction or on order, and proposals for the future, provides the following data:

Plant capacity installed at March 1, 1950—2,123,337 kW.

Estimated installed capacity in 1958—5,574,538 kW.

Estimated installed capacity in 1975—8,800,000 kW.

The 1975 figure includes the Snowy Mountains Scheme, which should provide about 2,800,000 kW. It is estimated that between 1950 and 1958 Australia will spend £276,000,000 on the provision of additional power generating capacity. The Snowy Mountain Scheme, not included in estimates, may cost another £200,000,000 over the next 25 years.

Cable for Brisbane

Brisbane City Council has accepted the tenders of three British firms for the supply of power cables, for linking the new Tennyson generating station with substations, at a total cost of £A416,161. The firms and tenders accepted are: British Insulated Callenders Cables, Ltd. £A144,843; Standard Telephones and Cables, Ltd., £A140,787, and Siemens Bros. and Co., £A130,531.

Consumers in Tasmania

A record total of 5,010 new consumers were connected to the system of the Hydro-Electric Commission of Tasmania in the year to June 30 last. The highest number connected in any previous year was 3,811 in 1948-49. Of the number connected in the year just ended, 22% were in Hobart and surrounding districts, 12% in the Launceston area, and 66% in other parts of the State.

No More Tariff Cuts?

The Canadian Electrical Manufacturers' Association is calling upon the Canadian Government to stop any further consideration of tariff reductions on the products they make, in order that the industry might be permitted to resume long-term planning and expansion programmes. A wide range of electrical goods is affected under the Geneva agreements by which tariffs on these products were reduced by between 10% and 33⅓%. These agreements are to come under further review at Torquay in September, when the nations who signed the Geneva agreements are to discuss further tariff reductions. Further tariff reductions now, according to the Association, would help the U.S. more than most other countries signatory to the Geneva trade agreement of 1947, and could aggravate still further the unbalance of trade with the U.S. with consequent "disastrous repercussions" upon the electrical industry.

Manitoba's Problem

For two years now negotiations have been going on between the Manitoba Government and the City of Winnipeg Council and other undertakings in the Province, concerning the future set-up for the supply industry, but the deadlock remains while the demand for electricity grows apace. Now it is feared there will be a power shortage in 1952 unless the matter is soon solved. Indeed, Winnipeg Hydro System may have to expand its steam turbine generating facilities by the installation of a 20,000 kW set, unless a decision is reached by September 1. It may be recalled that three years ago, Manitoba's power situation was the subject of a survey carried out by Dr. T. H. Hogg, previously chairman of the Hydro-Electric Power Commission of Ontario. His report recommended that the provincial government should assume responsibility for power development throughout the province. But Winnipeg interests control the largest and most economical sources of supply, and the city council has been reluctant to hand over its Hydro System, whose earnings have often helped the local rates. In view of impending power shortages, however, a compromise solution is being put forward, it is understood, under which a power pool would be established. Under this scheme the province would purchase all supplies generated by the Winnipeg Electric Co., City Hydro System, and the Government's own Pine Falls station, as well as from future power plants, and sell it back to the utilities at a higher price. The purpose of the pool would be to equalise high-cost power from proposed future developments with low-cost power from existing schemes. Expropriation of the Winnipeg-controlled sites would be postponed. Negotiations would also be entered into with Ontario for a long-term agreement for importing power from North-western Ontario.

Payment for Expropriations

The British Columbia Power Commission has made a payment of $1,211,792 to the West Canadian Hydro-Electric Corp., as a final settlement of the expropriation of the company's properties in the Okanagan district five years ago. The payment was made under an arbitration finding and brings to $3,289,700 the total paid to the company by the commission. To be made

shortly will be payments of $601,000 to Nanaimo-Duncan Utilities Ltd., raising to $1,706,000 the amount paid for its properties on Vancouver Island, and $67,000 to Columbia Power Co., bringing to $227,000 the total paid to that company. The Power Commission states that these payments bring to a total of about $8 million the amount it has paid for taking over private electric operations.

Appliance Production

Production of household electric refrigerators, excluding the apartment-type machine, in Canada during the first five months of this year amounted to 123,607 units, compared with 68,966 in the corresponding period of 1949. Washing-machine production over the same period amounted to 106,846 appliances compared with 154,644 in the first five months of 1949. But production of the latter appliances dropped from 29,782 units to 22,359 units in the month of May.

Berlin's Power

Last weekend saw the resumption of the export of electricity from East Berlin to West Berlin, after an interruption of more than five weeks. The move was the result of negotiations between East and West Berlin city officials on the terms of payment for electric power supplied from the Soviet zone. Negotiations on the conclusion of a new East-West Berlin agreement of electric power deliveries are still proceeding.

Kashmir Scheme

The Kashmir Government has commenced work on a new hydro-electric-cum-irrigation project. The scheme aims at harnessing the power potential of the River Sindh, a tributary of the River Jhelum, and carrying water required for seasonal irrigation and power-generating purposes through a masonry-lined canal to Ganderbal, 13 miles from Srinagar. Estimated cost of the scheme for the first stage would be about Rs. 15 million. The Government of India have made provision for a loan of Rs. 15 million to the State for this project.

N.Z.'s Future Power Supply

The potential of hydro-electric power in the South Island is so great that there will be no need for steam plants, stated Mr. W. S. Goosman, Minister in charge of the N.Z. State Hydro-Electric Department, in the House of Representatives last month. He was replying to a question about the installation of steam plants for power generation. He added that steam plants would be necessary in the North Island in a few years, as it did not have a hydro-electric power potential. Investigations into the possibility of generating power from geo-thermal steam were also being pushed ahead, so the Government may know as early as possible whether and how much power might accrue from that source. The ordering of ordinary steam plant should be deferred until there had been time to investigate the possibilities of geo-thermal steam. Mr. Goosman said that very good indications had been obtained from the investigations of geo-thermal steam. The first bore had been put down 550 ft and the pressure was 200 lb. The bore had been blowing for a considerable time, and other bores were being put down. No orders for steam-generating plant had been placed yet, but all action taken has been in line with the agreement arrived at last January between the Department and the supply authorities' engineers. Arrangements had been made for the installation of two extra units at Waitaki, and extensions were going on at Cobb, which would bridge the gap until the Roxburgh scheme came into operation in 1955 or 1956. So far as the North Island was concerned, auxiliary steam power will be needed.

A Distribution Scheme

As the first step in establishing a power supply for the east coast areas from Tolaga Bay northward to Ruatoria, the Poverty Bay Electric Power Board, N.Z., is to prepare estimates of the cost of the backbone line construction and distribution work in that region.

King's Wharf Proposal

Last month, Mr. H. J. London, partner in the firm of Preece, Cardew & Rider, returned from New Zealand where he investigated proposals for extending the King's Wharf power station. He is expected to send back his report in about two months' time. After investigations at King's Wharf station, Mr. London went to Wellington, calling at the Waikato hydro-electric development schemes on the way. In Wellington he met the Minister in charge of the State hydro-electric department, Mr. Goosman, and had discussions with officers of this department and the Ministry of Works on King's Wharf station and the general power situation. Following this he spent three days in the South Island during which he visited Dunedin. He is acting for the City Council there in extensions to its Waipori power scheme.

Bulawayo Expansion

The average Rhodesian uses electricity at a prodigious rate due, possibly, to leaving the use of electrical appliances to African servants, Mr. A. R. Sibson, city electrical engineer of Bulawayo stated last month. In many cities in Rhodesia, more units per head of population were sold than in the Union of South Africa. During the 1950-51 financial year, Bulawayo expected to sell 138,750,000 units. The city's station in 13th Avenue contains a 15 MW plant, and a further 14 MW extension is in course of erection and should be in commission next April. In addition, plant is on order for a further extension of 30 MW to be in operation by the end of 1952. Plans are also in hand for the installation of a further two 30MW units at some future date.

PERSONALITIES

IN THE INDUSTRY

Until recently deputy resident engineer and technical assistant with the Bury undertaking, Mr. **Vernon Walker,** A.M.I.E.E., has been transferred to the North Western No. 2 sub-Divisional staff at Kearsley. He has for many years taken a keen interest in matters relating to power station operation and efficiency and has contributed numerous articles on such subjects to THE ELECTRICAL TIMES. He has also been interested in the training of power station operators and was instrumental in forming one of the first "improvement classes" with the object of furthering interest in plant operation. He is the founder and hon. sec. of the Bury Engineering Society.

Mr. V. Walker

The secretaryship of the Association of Electrical Housecraft Advisors has recently been assumed by **Miss Kathleen Wilson,** who is in the B.E.A. headquarters commercial department. Miss Wilson has been in the industry since 1934 when she joined the General Electric Co., Ltd., as showroom assistant. Leaving temporarily to train and qualify, she later returned to that firm's cooker section as one of a team of demonstrators, but during the war worked in various departments until being placed in charge of the clerical staff in the travellers' section of the sales department. In 1945 she joined Edmundsons Electricity Corporation as senior housecraft adviser, and worked with the associated companies within the group until nationalisation. She is a one-time holder of the E.A.W. Elizabeth Sloan Chesser Cup.

Miss K. Wilson

Mr. Raymond Berry, chairman and managing director of Berrys Electric Ltd., has been elected chairman of the Electric Water-Heater Manufacturers' Association in succession to the late Mr. F. G. Nesbitt. The new vice-chairman is **Mr. F. L. Humber,** of Ferranti Ltd.

Ekco-Ensign Electric Ltd. have appointed **Mr. C. R. Lock** as representative for certain parts of Hampshire, Dorset and South Wiltshire. He will be based at the London office at 5 Vigo St., W.1.

New appointments in the engineering division of the British Broadcasting Corporation are announced. **Mr. R. T. B. Wynn,** C.B.E., M.A., M.I.E.E., becomes deputy chief engineer, with responsibility under the chief engineer (Mr. H. Bishop, C.B.E., B.SC.(ENG.), M.I.E.E., M.I.MECH.E.) for the general control and direction of all engineering departments. **Mr. H. L. Kirke,** C.B.E., M.I.E.E., becomes assistant chief engineer, with responsibility for the co-ordination and direction of the technical work of the research, planning and installation, designs and equipment departments. In addition, **Mr. W. Proctor Wilson,** C.B.E., B.SC., M.I.E.E., succeeds Mr. Kirke as head of the research department, and **Mr. E. C. Drewe,** M.I.E.E., becomes assistant head of that department. Mr. Wynn has been associated with broadcasting since the earliest days, joining the Marconi Company in 1922. After four years at the Writtle experimental station, he became head of the B.B.C. engineering information department in 1926. In 1935 he was appointed senior superintendent engineer, with responsibility for the operation and maintenance of all B.B.C. transmitting stations and studio centres, and in 1943 was promoted to assistant chief engineer. He was chairman of the I.E.E. Radio Section in 1949-50. Mr. Kirke started with the Marconi Co. in 1920, being one of the pioneers of the Writtle Station. In 1924 he joined the B.B.C., and in the following year was appointed head of the development department, which later became the research department. In 1949 Mr. Kirke gave up that post to become responsible for the co-ordination and direction of the technical work of the specialist departments. Mr. Proctor Wilson joined the B.B.C. in 1927, having previously been with the Western Electric Co. He worked under Mr. Kirke at Savoy Hill until 1930 when he joined Marconi's Wireless Telegraph Co. In 1933 he returned to the B.B.C., rejoining the research department, where he remained until 1939. Returning from the R.A.F. to the B.B.C. in 1945 he was appointed assistant head of the Research Department, and in 1949 he became acting head

Mr. R. T. B. Wynn

Mr. H. L. Kirke

of the department. Mr. Drewe joined the B.B.C. research department in 1930, afterwards being engineer-in-charge of the Brookmans Park Station. He successively held the posts of senior assistant to the superintendent engineer, transmitters, in 1940, assistant head of the engineering secretariat, and, from 1945, research manager.

The new deputy station superintendent at West Ham generating station, London Division, B.E.A., is **Mr. A. H. Chandler,** who was previously turbine house superintendent there.

At present traffic manager with the South Wales Transport Co., Ltd., **Mr. W. Mayes** has been appointed transport manager with Darlington Corporation transport system, in succession to the late Mr. W. J. H. Penman.

At the beginning of this month **Mr. H. S. Holbrook,** B.SC., M.I.E.E., FEL. A.I.E.E., relinquished the managership of the Transformer Engineering Department of the British Thomson-Houston Co., Ltd., on being appointed consulting engineer on transformers. As an acknowledged authority on transformers, he will now be able to devote his time more fully to work on committees and panels, not only within the transformer industry, but at national and international level. As a result of this change, **Mr. K. W. McBain,** M.I.Mech.E., M.I.E.E., MEM.A.I.E.E., who has been with the B.T.H. Transformer Engineering Department for many years, latterly as chief assistant to Mr. Holbrook, is now manager of the department. Mr. Holbrook joined B.T.H. in 1910, being appointed chief transformer engineer in 1929, since when he has been actively associated with the development of many new transformer constructions. He has travelled widely, and devoted much time and service to various technical committees. It will be recalled that he presented a paper on power transformers for 200 kV and above at the first B.E.P. convention in 1949. Mr. McBain joined the staff of the B.T.H. transformer drawing office in 1924, but later transferred to the transformer engineering department, where, for a considerable time he has been in charge of the large high voltage transformer, rectifier transformer, and miniature transformer sections of the department, being responsible for electrical and mechanical design. He, too, is well known to many engineers in different parts of the world.

Mr. H. S. Holbrook

Mr. K. W. McBain

The Sun Electrical Co., Ltd., has appointed **Mr. J. Smith** to the vacant position of manager of their Leeds branch, following on the recent death of Mr. D. M. Fraser. Mr. Smith has until the present time been manager of the first Newcastle-on-Tyne branch, but is familiar with the Leeds area, for, earlier, he had been Mr. Fraser's right hand man there for some time.

Mr. J. Smith

Due to arrive in this country in about two weeks' time is **Mr. A. L. Blake,** general manager of Cable Makers Australia Pty. Ltd., who is flying via the United States. He may be contacted here c/o the London Office of British Insulated Callender's Cables Ltd.

Miss Vera Norvick, assistant secretary of the Electrical Association for Women, has added to her public responsibilities by accepting the chairmanship of the Women's Committee of the Housing Centre.

We learn that **Mr. P. M. Kenward,** who joined the staff of Berry's Electric Ltd., in February of this year, has now been appointed Eastern Counties representative, his territory embracing that covered by the Eastern Electricity Board. Mr. Kenward, who received his technical education at Brighton, served during the war with the Royal Artillery as a radar officer. He was formerly with the Eastern Electricity Board at St. Albans, and was responsible for the Consumers' Section of the Mains Department.

Mr. P. M. Kenward

For the post of senior lecturer in electrical engineering at Queen Mary College, **Mr. R. L. Fortescue,** M.A.(cantab.), A.M.I.E.E., has been selected. Since 1945, he has been working at the Atomic Energy Research Establishment at Harwell, as a principal scientific officer. Mr. Fortescue is to be responsible for the development and use of the new laboratory, the construction of which has been commenced, for the study of high voltage particle accelerators. Machines used in nuclear physics and radio-therapy, and principles relating to the use of nuclear energy, will be studied in the new laboratory.

Mr. M. E. Mustin, Mr. E. R. Norbury and **Mr. A. G. Jackson** have been appointed additional directors of Ward and Goldstone Ltd.

J. H. Tucker and Co., Ltd., announce the appointment of **Mr. H. Finch** to cover their sales interests in the North-West England area. On urgent matters he may be contacted by telephoning Formby 943.

Mr. N. Robinson has been appointed power station superintendent at Londonderry generating station.

The Rheostat Co. Ltd. has appointed **Mr. J. S. Smith** as resident engineer for the Midland area. He took up charge of the Birmingham office this week. Mr. Smith previously worked at the head office of the company at Slough for a number of years.

Mr. H. G. Campbell, assistant managing director of Benjamin Electric Ltd., has been appointed joint managing director of the company.

Last week, **Mr. G. Brinsley,** of Johnson and Phillips Ltd., was presented with a silver cigarette box suitably inscribed as a token of appreciation for his 50 years' service with the company. He has worked in various departments, since 1919 in the paper cable works.

Mr. R. J. G. Robertson, B.E.E., has been appointed power and heating engineer, Electrical Development Division, Electricity Supply Department of the State Electricity Commission of Victoria. Since December, 1947, he has been the Commission's illumination engineer.

A signal honour was bestowed upon **Dame Caroline Haslett** last week when she was elected president of the International Federation of Business and Professional Women at its fifth congress held in London. This was the first time that the presidency has been held by an English woman. For the past 20 years, the president has been an American.

Mr. Arthur Lockwood has been appointed chairman of the Southern Electricity Consultative Council, in place of the late Major Sir Hubert Young.

Mr. J. E. Hodgkin, M.I.E.E., has resigned his chairmanship of the board of directors of Barton and Sons, Ltd., and **Mr. A. H. Redfern** has been elected chairman in his stead. Mr. Hodgkin will remain a director.

NEW LITERATURE

Accumulator Charging

by W. S. Ibbetson, B.Sc., A.M.I.E., M.I.Mar.E.

DEALING comprehensively with all the practical aspects of accumulator charging, maintenance and repair, this volume has deservedly won for itself a sure place in the library of the electrician, of which fact its present appearance in a tenth edition is evidence. A comprehensive revision has been carried out, and some matter previously dealt with in an appendix has been incorporated in the body of the work. A new appendix discusses the care and maintenance of miners' electric safety lamps.

Elementary electric theory and the principles of storage cells occupy the first part of the book, which then passes to details of modern accumulator construction and methods of charging. Faults and repairs are dealt with at the end, together with typical large installations. Published by Pitman's, 193 pages, 7¼ in. by 4¼ in. Price 10s.

Electrical Power System Control

by H. P. Young, M.I.E.E.

THE appearance of a third edition of this monograph only four years after a revised second edition is itself a tribute to the usefulness of this volume, and for the most part it remains unchanged. Two new chapters have been added, however, both dealing with automatic protective gear, the first concentrating on the principles of systems for feeders, and the second with this type of protection applied to generators, transformers and busbars. These chapters follow the pattern of the rest of the book in starting from a simple arrangement and then showing how refinements in design result from the need to fulfil certain requirements.

Principles underlying the successful parallel operation of generators are the subject of Mr. Young's first chapter, and he follows this up by considering voltage control, automatic regulators and synchronising. A chapter on the use of reactors to restrict short circuit currents leads on to the consideration of circuit breakers, switchgear arrangements and short circuit calculations. Next comes the interconnection of power stations and the control of interconnectors, and the volume ends with the chapters on automatic protective systems already mentioned, and a further one on automatic supervisory control. Published by Chapman and Hall Ltd., 456 pages, 8½ in. by 5½ in. Third edition, price 28s.

BOOKS RECEIVED

Antenna Theory and Design, by H. Paul Williams. Comprehensive study. Published by Pitman's in two volumes, 142 pages and 522 pages respectively, 8½ in. by 5½ in. Price 21s. and 63s.

The Theory and Design of Inductance Coils, by V. G. Welsby. Advanced study for the circuit designer. Published by Macdonald and Co. (Publishers) Ltd., 180 pages, 8½ in. by 5½ in. Price 18s.

Matrix Analysis of Electric Networks, by P. Le Corbeiller. Kron's methods presented for electrical engineers. Published by Chapman and Hall, 112 pages, 8½ in. by 5½ in. Price 24s.

The Protection of Transmission Systems Against Lightning, by W. W. Lewis. American methods. Published by Chapman and Hall, 418 pages, 9 in. by 6 in. Price 64s.

The Electrical Handbook for Women, edited by Dame Caroline Haslett. Published by the English Universities Press Ltd., 481 pages, 6¾ in. by 4¼ in., 5th edition. Price 10s. 6d.

Time-Wasting Fittings

The Wireman's Point of View

By J. T. ROBERTS

AT times, I am rather inclined to take a poor view of present-day electrical fittings, as used in the contracting industry. It seems to me, that the ultimate problems of installation and maintenance which confront the tradesman are often given the least consideration in design. This does not imply that reputable switches, starters or fittings are inferior in performance or manufacture, but rather that the cumulative effect of small details can give the contractor extra work—work which could be profitably avoided.

Switches

Take the everyday ironclad switch-fuse set for example. Generally a reliable, robust fitting which has nowadays attained a high standard of efficiency. Yet, when the supply is led in through the bottom entry, how awkward it is at times to slip the cables into the terminals situated immediately above the switch bar ! Conversely, when it is necessary by reason of appearance or situation, to bring the *circuit* cables through the bottom entry, we find that access to the top of the switch is obstructed by the porcelain interior. True, some manufacturers provide a small space at the left-hand side, but this increases the overall width.

So why not all follow the example of one manufacturer, by providing the porcelain interior with pillars, so that cables may be easily passed behind the porcelain and thence into their respective terminals ? Simple, effective, time-saving.

The introduction of microgap switches for lighting and heating has been a great improvement in design, but, I for one would like to see the abolition of the time-wasting switch rings, which are still to be found on some types of flush fitting units. Universal use of two-plate fixing screws, tapped into the body of the switch, would give a much quicker arrangement and save the tradesman much adjustment.

For what it is worth, I believe that the introduction of a suitably rated cartridge fuse in every new switch socket, would effectively prevent overloading of outlets by the indiscriminate use of adaptors and appliances. After all we do have fused plugs and clock connectors, which, however, only protect the appliances concerned. The addition of a fuse would ensure a greater degree of safety, since each point would be in the nature of a sub sub-circuit. Then the tradesman would also be able to isolate the source of trouble much more quickly.

Lighting Fittings

From the installation point of view, the most awkwardly designed accessories are ornamental lighting fittings, such as the three-light domestic ceiling type. The present accepted method of erection is possibly about the most inefficient there is. Where conduit boxes are not available at the ceiling point, as is the case with l.c. and t.r.s. systems, the fitting is held up, the flex is jointed to the cables, and then the flange is secured to the ceiling, with or without wood block. Since it is usual for one man to do this job, the awkwardness of such a procedure has to be experienced to be appreciated.

Why not design a small multipin bakelite socket, similar to a radio valve base, which could be connected up and fixed to the wood block or conduit box ? The number of pins would depend upon the switching arrangement, and an earthing pin could be included, since I fear that very few fittings are earthed, unless supported by metal screws from conduit boxes. The fitting itself would have a small bakelite base with corresponding pins, housed behind the backplate, so that it would simply require to be lifted up, plugged in, and then screwed up to the ceiling. A simple arrangement, but think of the saving of time and energy.

To give due credit on the other hand, let us thank the designers of ceiling type fluorescent fittings, for an easily erected appliance. Yet even here we get fittings with the starter switch situated immediately behind the tube, or concealed within the fitting. When repairs are required, one must either remove the tube each time, or dismantle the fitting, to try out a new starter switch—no easy matter when on a high ceiling. If the starter is to be concealed, why not provide a small detachable cover to give easy access ?

It can be seen that the main argument in favour of these comments is the saving of time, spent on needless work at nearly 1d. per man-minute. Would such wastage be tolerated in a factory ? I doubt it.

E.R.A. Reports

Arcing Characteristics of Fuses with Small Overcurrents, *by H. W. Baxter,* B.SC.(ENG.), A.M.I.E.E. *and M. T. Cree.* (Report G/T228, price 7s. 6d.).—Fundamental investigations of the behaviour of fuses when they operate to interrupt small overcurrents are discussed in this report. On the basis of a series of tests it is concluded that prospective currents between one and five times the minimum fusing current may cause prolonged arcing, then small overcurrents at which the operation of the fuse is inherently difficult depending more on the length of the fuse element than on its minimum fusing current. The effect on arcing voltage of various details of fuse construction is dealt with.

Indexing and Filing System for Engineering Drawings Showing Details of Substation Design, *by Dipl.-Ing. G. Meiners* (Report G/T240, price 6s.).—Ancillary to report G/T207, this report contains information supplied by Mr. Meiners after his return to Berlin. The previous report had led several people to enquire how, with its application, a given drawing could be found: the answer is given in this present publication.

The Time Involved in Fast Electronic Processes in Amorphous Dielectrics, *by J. O'Dwyer* (Report L/T230 (Amended), price 3s.).—A theoretical discussion is given for the times of processes which involve only electrons in the conduction levels and in shallow traps of an amorphous dielectric in the presence of an electric field. A simple model is considered in which there is a conduction band and a series of equispaced impurity levels below it. The processes considered are then found to be sensibly complete in 10^{10} seconds or less.

Properties of Slow Electrons in Polar Materials, *by H. Frohlich, H. Pelzer, and S. Zienau* (Report L/T221, price 6s.).—The properties of a slow electron in a polar crystal are investigated, taking into account its interaction with the polarisation produced by itself. Contrary to previous suggestions it is found that this does not lead to self trapping, but that the electron behaves essentially like a free electron; this is due to the slow variation of the interaction with the velocity.

Electrolysis and the Bond Strength of Reinforced Concrete. The Effect of Direct Current. Supplementary Report, *by G. Mole,* PH.D., F.INST.P. (Report O/T6, price 3s.).—This additional report shows that short cathodic treatment followed by prolonged storage increases bond strength by 22%, while sustained cathodic electrolysis at a suitable low current density can give rise to an increase in bond strength of the order of 29%.

Copies of the above may be obtained from the E.R.A., at Thorncroft Manor, Leatherhead.

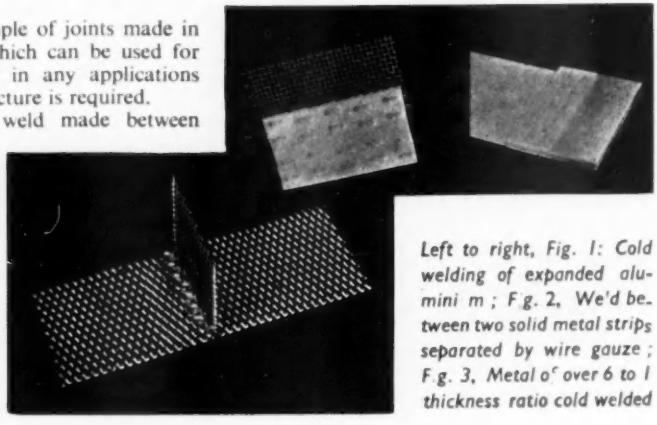
Cold Welding—Further Developments

FURTHER investigation into the cold pressure welding process, originally developed by the research laboratories of the General Electric Co., Ltd., has succeeded in producing examples of joints which are difficult to achieve by any of the usual welding methods.

Fig. 1 shows an example of joints made in expanded aluminium, which can be used for screening purposes and in any applications where a stable open structure is required.

Fig. 2 illustrates a weld made between two pieces of solid metal separated by wire gauze. Applications of this type of weld include all types of insect-proof screens.

Other examples include an example of the welding together of different thicknesses of material. Fig. 3 shows two pieces of the same metal, whose thicknesses are in the ratio of 6·25 to 1, welded together. Satisfactory welds can also be achieved by using certain dissimilar metals, e.g. aluminium and copper and with thicknesses up to a ratio of 20 to 1.

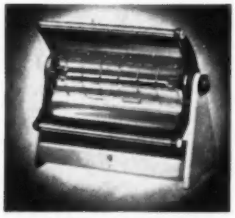


Left to right, Fig. 1: Cold welding of expanded aluminium; Fig. 2, Weld between two solid metal strips separated by wire gauze; Fig. 3, Metal over 6 to 1 thickness ratio cold welded

The BUYER'S *Column*

B.N.E. ready for the New Season

LATEST electric fire which BRITISH NATIONAL ELECTRICS, LTD., of Newarthill, Motherwell, are marketing ready for the 1950-1951 heating season is this attractive new reflector Model No. F.103.



B.N.E.'s latest model

It conforms to the latest practice regarding interchangeability of elements and protection against fire and accident risk and is soundly constructed both electrically and mechanically. Of generous proportions, 18 in. wide, 16½in. high and 10 in. deep, the fire has an extra wide reflector which ensures an even spread of heat. The two rod-type elements are shielded by an efficient chromium-plated guard.

Colour scheme is black and ivory and the loading 2 kW. Price, reasonable for a fire of this quality, is £5 10s., plus purchase tax.

Bunker Level Control

A VARIETY of interesting uses have been reported for the BL49 bunker level control introduced recently by RADIOVISOR PARENT, LTD., of 1 Stanhope Street, London N.W.1. This simple unit incorporates a projecting rod-type electrode which may be of any length to suit the requirements of the installation. It is electrically connected to a control unit comprising a single-stage thermionic valve amplifier incorporating coloured lights and connections to an external audible alarm.

One interesting application of this equipment is for controlling the level in bunkers holding coarse, crushed silica stone, the moisture content of which varies up to 15 per cent. In the past, due to inattention on the part of the operators, damage and hold-ups have been caused through failure to stop the feeding mechanism when the bunker was full, and thus the introduction of some form of foolproof and automatic control became imperative. When damp, this material sticks to glass with a tenacity almost equal to that of cement. Consequently, the use of ordinary photo-electric methods involving the projection of a beam of light onto a receiver, is not possible because of obscuration of the glass windows. For this reason, the new Radiovisor BL49 control was chosen.

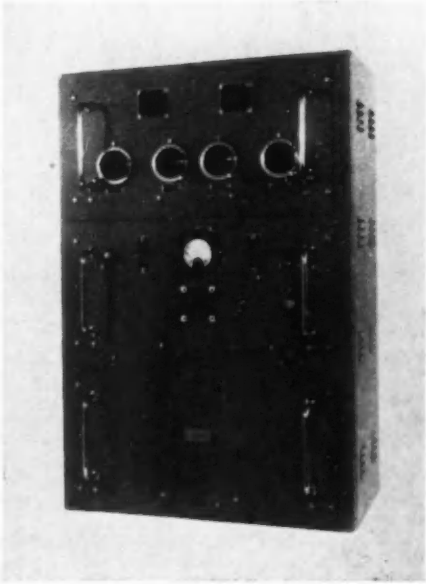
The material is stored in a twin-bunker fed from a common chute having a two-way outlet which, by movement of a plate valve, can be arranged to discharge into either bunker. Two 12-in. electrodes, one in the top of each bunker, are connected to a common control panel: to avoid chances of damage, the position was chosen so that neither electrode is in the direct line of flow of the material as it discharges into the bunker.

A green light shows on the control panel, indicating that filling can proceed. When the material level rises until it touches the electrode, a circuit is completed, thus closing a relay and causing a red light to show. At the same time, the motor responsible for feeding the material to the chute is automatically stopped, and an audible alarm sounded to attract the attention of the operator.

New Plessey 50W V.H.F. Transmitter

THE 50W, V.H.F. transmitter, Type PT.15, recently introduced by the PLESSEY CO., LTD., Ilford, Essex, has a wide field of application in providing R/T communication wherever a compact fixed station transmitter, with a carrier power output of this order, is required. The complete equipment comprises an R.F. unit, a modulator combined with a control unit, and a power supply, each in the form of conventional 19-in. panels. The three panels as supplied are mounted one above the other in a robust metal cabinet, and provision is made for easy access to the components on each.

Covering the 118-132 Mc/s frequency band, the crystal controlled operational frequency can be



The Plessey 50W Type PT15 V.H.F. transmitter

varied by insertion of the appropriate crystal. It is then necessary only to tune for a maximum or minimum meter reading, according to the stage concerned. Where required, other frequency ranges between 70-184 Mc/s can be provided to order. Frequency stability complies with international requirements.

Operation is simple, bandpass circuits in the R.F. unit reducing the number of tuning controls necessary. Control is local, but "Press to Transmit" facilities may be extended up to 25 miles. A power output monitor may also be incorporated if required.

Servicing is simplified by the provision of switched meter indication of each stage in the R.F. unit, together with test points to cover all other sections. Pilot lamps mounted on the modulator front panel indicate L.T. "on" and H.T. "on."

The equipment operates from a 230-V 50 cycle mains supply.

'Comelco' introduce totally-enclosed fittings

TOTALLY enclosed fittings available in 4-ft and 5-ft batten types have now been introduced by the COMMERCIAL ELECTRIC CO., LTD., 110 Sackville Street, Manchester 1, manufacturers of fluorescent lighting equipment. These fittings are to meet the demands for inexpensive fittings where a full length backplate is required.

Warm o'Cool

THE new "Warm o'Cool" industrial fan heater the "M.E. Eclipse" model has been especially designed as an export model.

The "M.E. Eclipse" fan-heater

Its attractive appearance is in accordance with its efficiency as an air conditioning unit. Simplicity in operation is the keynote to this design. Once the thermostat is set for the required temperature the only other action required is the setting of a small switch on the front panel of the heater to winter or summer positions as appropriate.

In winter the cold air at floor level is drawn through the fine copper gauze screen at the rear of the unit and warmed to 110° F. at 300 c.f.m. In a few minutes all the air is treated and the thermostat then maintains the required temperature. Radio interference suppressors are fitted to these models.

This is one of several industrial models which are available from the manufacturer, SOUTHERN CENTRAL HEATING CO., 4 Stanley Road, Southend-on-Sea, Essex. The ratings range from 1½ to 10 kW.

New Development in Gauges

TWO new developments in the range of equipment manufactured by W. EDWARDS AND CO. (LONDON), LTD., Worsley Bridge Road, Lower Sydenham, S.E.26, have now been announced.

Number one is a new capsule dial gauge, Model CG1 a barometrically compensated precision instrument for the continuous measurement of low gas and vapour pressures. It is unaffected by barometric changes and has no manometric or sealing liquids hazards.

The second is an inexpensive Pirani type gauge with leak detection. It is a hot-wire type gauge operating from mains or batteries with full leak detection facilities. Its range is 0·5 to ·001 mm mercury and brings precision high vacuum measurement within the range of many schools and institutions hitherto unable to secure these instruments.

TRADE PUBLICATIONS

LIGHTING REFLECTORS. "Thorlux" lighting by F. W. Thorpe, Ltd., Welby Road, Hall Green, Birmingham 28, is illustrated in the latest list No. 1033 issued by the company.

TABLE COOKER. Revo's Princess and Pearl cookers are now described in attractive leaflets issued by the makers, Revo Electric Co., Ltd., Tipton, Staffs.

SWITCHGEAR. Much of the first quality equipment manufactured by the company is illustrated in the up-to-date catalogue issued by Contactor Switchgear, Ltd., Moorfield Road, Wolverhampton.

TELECOMMUNICATIONS. Three channel carrier telephone equipment type SUS/SUT is the subject of Engineering Bulletin 2213 issued by the Automatic Telephone and Electric Co., Ltd., Strowger Works, Liverpool 7.

MOTORS AND EQUIPMENT. The L.D.C. plan of service for electric motor users is set out in detail in a recent brochure issued by Lancashire Dynamo and Crypto, Ltd., Trafford Park, Manchester 17.

TRANSFORMERS, ETC. A list of the principal products of Foster Transformers and Switchgear, Ltd., South Wimbledon, London S.W.19, is now available.

SWITCHFUSE CONTROL UNITS. From George H. Scholes and Co. Ltd., Wylex Works, Wythenshawe, Manchester, comes a four-page colour leaflet describing the "Wylex" switch fuse control units in both enclosed patterns and in skeleton form for mounting in customers' own cases.

DEXION ANGLE. No. 7 of the "Dexion News," issued by Dexion Ltd., 189 Regent St., W.1, gives a number of interesting applications and suggestions for Dexion slotted alloy constructional angle, from factory pallets, tables, and racks to car bodies, diving boards and fire escapes, together with price list of items and accessories.

THE WEEK

INDUSTRY *in news* COMMERCE

New Association—a Reply

WITH regard to our note last week of the formation of a new Association under the title of the National Association of Manufacturers of Electric Lighting and Allied Equipment, we have now received an announcement from the Electric Light Fittings Association on the matter. This states that presumably the Fair Trading code referred to by the new body is the British Electrical Industry Fair Trading Policy as enunciated by the Electrical Fair Trading Council. Four of the firms now named as founder members of the new organisation were, until very recently, members of E.L.F.A., but as they could not agree to operate the Fair Trading Policy they resigned from the Electric Light Fittings Association, it is stated. E.L.F.A. have strictly observed the Fair Trading Policy in all details from its inception, and furthermore, there are no restrictive arrangements between the E.L.F.A. and the electrical contractors and retailers.

Hoover-Selfridge Cheque to Charity

SELFRIDGES, well-known London store and winners of the 1950 Hoover spring window display contest, have decided to hand over the 100 guineas cheque to four trade charities.

At the Dorchester Hotel luncheon last week, Mr. F. H. Bonn, director and general sales manager of Hoover Ltd., presented to Selfridges the silver challenge cup and the cheque.

Expressing the thanks of Selfridges Ltd., Mr. E. W. Gilland, their director and sales manager, announced that the cheque would be divided equally between the following trade charities: E.I.B.A., the Linen and Woollen Drapers Institution and Cottage Homes, the General Porters Benevolent Association and the Warehousemen, Clerks and Drapers Schools.

Cheques for 50 guineas were also presented to the Hyde (Cheshire) centre of the N.W. Electricity Board, and to Moulds Ltd., Leatherhead, who were prizewinners in the Electricity Board and Electrical Contractor and Ironmonger groups.

Contractors—Holiday Agreement

MEN taking their annual paid holiday at such a time when a paid statutory holiday occurs during this period will be entitled to an alternative paid holiday in substitution either immediately following the paid annual holiday or subsequently during the same calendar year.

Such is the substance of an agreement reached by the National Joint Industrial Council, which stipulates this new arrangement providing that the operative takes his holiday in accordance with the industry's annual paid holiday agreement which is dated June 2.

The decision came into operation on July 19, 1950.

Turbo-Alternators free from Control

THE Control of Turbo-Alternators (No. 1) Order, 1947, which stipulated the standardisation of design and construction of these machines, has now been cancelled by another Order brought into operation by the Minister of Supply as from August 1. Statutory Instrument No. 1221 (1950), published by H.M.S.O., gives details of the Control of Turbo-Alternators (No. 2) (Revocation) Order, 1950.

Swann Diploma Awards

FOUR candidates were successful in the fifth (1950) examination of the diploma scheme of the Association of Supervising Electrical Engineers. Each has been awarded the Swann Diploma.

The four successful candidates were: In electrical installation and maintenance, W. Langley, of Manchester, who was awarded a diploma with honours, having obtained credits in technical ability, administration, planning of installations and organisation of work; and R. C. Martin, of Brighton, who obtained credits in technical ability, administration and the planning of installations.

Messrs. R. P. Hilton, of Liverpool, and C. H. Derton, of Birmingham, passed the examinations in electrical maintenance.

It is stated that candidates who passed Part I only of the examination have been advised and will be entitled to sit again within two years for Part II.

The First Half-Century

Quite a Gilbertian situation was provided for the inhabitants of Dudley the other day by the action of the Municipal and B.E.T. authorities. The former have their lighting cables laid on the solid system; they wished the company which is bringing in a tramway to do likewise. The company, it appears, decided on the draw-in system and to this the corporation objected. According to the local press an amusing scene was enacted for two or three days, the corporation men filling in the company's trenches as they were dug. When the company carted the excavated earth away, the corporation brought up ash and refuse. They also laid a traction engine in the way. But the company dug under this and succeeded in laying pipes by building a laager and working inside.—*From our issue of August 9, 1900.*

A credit in any bank, Atlas "Quickstart" warm white fluorescent lighting was especially designed for the fine hall of the Chartered Bank of India, Australia and China in London.

Henley's endow Research Fellowship

THE Governors of Queen Mary College have had pleasure in accepting an offer made by Messrs. W. T. Henley's Telegraph Works Company Ltd., for the establishment of a Research Fellowship in Electrical Engineering at the College.

The Fellowship will be known as the W. T. Henley Fellowship and, as the maximum remuneration is £600 per annum, it will be possible to attract to the College senior research men who have already had some works experience. It is hoped that the investigations carried out by the W. T. Henley Fellows will be more particularly in the field of dielectrics, high voltage engineering, and arc-interruption phenomena, for which the resources of the College are particularly good.

Science Library Periodicals

A NEW edition of the *Hand List of Current Periodicals* in the Science Museum library is now available from H.M.S.O.; the price is 7s., postage 6d.

Since the war the progress in this section of the library has been such that there are about 7,000 current periodicals listed in this new edition. These are in many languages and from many countries; they cover all subjects under the heading pure and applied science, with the exception of clinical medicine.

This new sixth edition is in a new format, by photography from the visible index in the library. The sacrifice of the dignity of print is balanced by the fact that frequent new editions become possible should the venture receive sufficient support.

As the method of production restricts the edition to small numbers, it is advisable to order at once from the Science Museum, South Kensington, S.W.7, or from H.M. Stationery Office.

Statutory Compensation to Municipalities

UNDER the 1947 Act, a sum of £5 million was set aside as compensation to local authorities for the severance of their electricity undertakings. The basis on which this compensation is to be paid is now laid down in the Electricity (Severance Compensation) Regulations 1950 No. 1278. Compensation will be based on the figures for the year 1946/47 and will be of the following amounts: For each 1,000 units generated, £0·0148; for each 1,000 units sold, £0·0148; for each £1 of revenue, £0·006; for each consumer, £0·523. It is, therefore, seen that the chief weighting has been given to the number of consumers. It is further provided that in no case shall the amount of compensation to any local authority exceed £1 per consumer. Finally, after compensation on this basis, should there by any excess, it is to be distributed equally amongst all local authorities.

This engine shop, claimed to be the largest in Britain, at Cammell Laird's Birkenhead Works, was recently equipped with an installation of 3 rows of Benjamin 1½ kW high bay units mounted 74 ft. above floor level. Total load in the three bays is 235 kW. The units have a heavy duty Sunflux top and clear glass visor cover, these coupled with the colour scheme, aluminium painted structural steelwork and the machines in brunswick green are responsible for the excellent standard of illumination

Albright and Wilson to make Silicones in U.K.

HAVING acted for the past four years as distributors of silicones in Great Britain for the Dow Corning Corporation of America, Albright and Wilson Ltd. now announce their intention to commence manufacture of silicones in this country.

These silicone products are available in many forms, including insulating compounds for sealing high voltage ignition systems and h.f. equipment, fluids for waterproofing insulating surfaces, heat resistant waterproof materials for use in electrical insulation and as bonding agents and protective coatings.

When manufacture begins it will be possible to meet the requirements of the many firms whose allocation has hitherto been restricted owing to supply difficulties.

T.V. Rediffusion Applications

WHEN application was received by Middlesbrough General Purposes Committee from local radio and television dealers for the operation of a rediffusion service in the town, the committee approved the idea in principle. They also decided to investigate the possibility of the Corporation operating a rediffusion service. Alderman F. C. Pette said this might prove a really profitable municipal enterprise. Vast sums of money had been made by firms operating relay services in other towns.

At Scarborough the Town Council has received applications from Scarborough Relay Services Ltd., and Good's Radio and Electrical Engineers to operate a television relay service. Consideration of the matter was deferred pending the receipt of further information.

25 together equals 860

RECENT ceremony at the Liverpool Electric Cable Company's Linacre Lane, Bootle, works was that of the presentation of long-service awards to 25 employees whose total services amount to more than 860 years.

They were guests of the directors at a ceremony when Mr. W. J. Terry, managing director, presented each with a long-service badge and National Savings Tokens to mark the occasion.

Mr. Terry said he was very conscious of the help the staff had given. Likening the firm to a ship at sea, he said "it must have its navigator and heads of departments, but it is the staff which keeps the ship steady and in a position to make port."

Mr. J. T. Frost, works manager, also expressed his thanks to the staff for their loyalty and good work.

Mr. J. Catherwood, foreman, voiced the appreciation of the employees and made a fitting response on their behalf.

Bournemouth Lighting Lectures

DISPLAY representatives of Bournemouth's leading retail stores attended a lecture and demonstration of window and display lighting given by Mr. T. S. Jones, chief lighting engineer of Messrs. Crompton Parkinson Ltd., at a meeting sponsored by the Southern Region branch of the British Display Association, held at Bournemouth on Tuesday, July 11, 1950. Mr. L. Tuckett, display manager of J. J. Allen Ltd., and chairman of the Southern Region branch of the B.D.A., presided.

Consultative Council Criticisms Rebuffed

FOLLOWING on the recent adverse comment in Parliament on the functioning of consumers' councils, the chairman of the South-Western Electricity Consultative Council, Ald. H. J. Perry, has jumped to the defence of the councils.

Replying particularly to statements made in the Commons by Mrs. Lucy Middleton, Member for Sutton, Plymouth, Ald. Perry said that the remarks of Mrs. Middleton implied that a number of her constituents had complained of lack of attention to their queries for advice and assistance.

He stressed that soon after the establishment of the consumers' council they had written to all M.P.s in their area offering them the assistance of the Council and expert advice in dealing with complaints received on the question of electricity supplies. Ald. Perry said that he was not aware that Mrs. Middleton had made any extensive use of this service. Referring to allegations that consumers did not know how to contact their council, he pointed out that a notice was prominently displayed at all service centres and offices.

The scene at the recent Liverpool Cables' Long Service ceremony. Centre seated is Mr. W. J. Terry, managing director of the company and behind him, standing, is Mr. J. T. Frost, who is the works manager. Each of the employees who were guests has completed 40 years' service

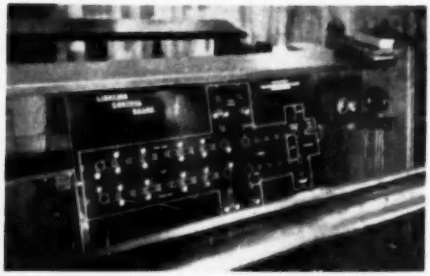
"Wakes" for Exide Workers

NEARLY 3,000 workers, and their families, from Exide's works had a day by the sea, by courtesy of the directors of the company recently. The number was swelled by the arrival of parties from Exide depots and offices all over Great Britain, who joined their colleagues at Blackpool. Pensioners who joined the young folk numbered 32 and between them mustered 1,047 years of service.

Donning novelty "boaters" labelled Exide the 3,000 spread themselves and the name of the company throughout the town to return tired but happy some eight hours later.

Beverley Minster

FURTHER to our article in last week's issue regarding the new lighting installation, we illustrate this week the control panel which, mounted in the verger's pew, enables any combination of lighting to be selected, the switches being mounted in their appropriate positions on a plan of the Minster.



This is the control panel for the new Beverley Minster lighting

"Pack It This Way"

FOR some time now emphasis in advice on dollar sales has been on packaging. It is a well-known fact that the New World consumer is as impressed by appearance of the finished goods and the method of packing as he is by their intrinsic quality.

B.E.T.R.O. (British Export Trade Research Organisation) has now produced a survey of this important factor. They have studied in detail the design of packaging which sells goods in the North American continent.

Although this report is concerned more with the idea of display than of protection, and the selected products are few and not associated with the engineering industries, it does, nevertheless, give several pointers to the style which "sells".

Entitled "Packaging consumer goods for the Canadian Markets" the report is available from H.M.S.O., York House, Kingsway, London W.C.2, and Branches.

B.T.H. industrial intercommunication equipment has been installed at the Rugby Portland Cement Co.'s works at Southam. This is probably the first installation in a cement works. The system enables operators at the two packing stations serving five loading points to speak with the loading team they serve, and vice versa, thus speeding up dispatch considerably

Inst. P. Lab. Arts Certificate To Go

THE Board of the Institute of Physics announces that the Institute's Certificate in Laboratory Arts will not be awarded after 1951, in view of the establishment of the Intermediate Certificate for Laboratory Technicians by the City and Guilds of London Institute, which it welcomes.

For some time it has been felt desirable that there should be a certificate which would be of value to technicians in a wider range of laboratories and, following various conferences and meetings, the City and Guilds of London Institute agreed in 1949 to set up an exploratory committee to suggest suitable conditions and syllabuses for such an award. The Institute of Physics was represented on this Committee, whose work has resulted in the publication of regulations and syllabuses which are coming into operation in the session 1950-51.

The City and Guilds Institute has agreed that holders of the Institute of Physics' Certificate shall be eligible to enter the course for the Advanced Laboratory Technicians Certificate to be established shortly, on the same terms as those who have passed examinations for the new Intermediate Certificate. Students who have already begun courses for the Institute of Physics' Certificate will be able to complete these by 1951 after which the Institute of Physics will no longer examine in Laboratory Arts.

Instrument Technology

THE *Transactions of the Society of Instrument Technology*, vol. 2, No. 1, have been received. This excellent publication does much to further the aims of the Society, which was established five years ago to further the advancement of instrument technology by disseminating information and promoting discussion relating to the design, application and maintenance of instruments, and by encouraging research and technical education in the subject by raising the status of those employed in the manufacture and use of instruments.

The Tone takes Another Turning

THE South Western Electricity Board recently turned civil engineers when they were confronted with the problem of laying cables across the River Tone at French Weir, near Taunton.

Damming operations were carried out by the Central Construction Department to allow the laying of part of the Taunton-Bishop's Hull cable section of the new 33 kV line which will join Taunton with Wiveliscombe.

In order to meet the views of the Tone Catchment Board the cables were laid beneath the river bed; this involved lowering the water level by several feet. The work was rendered difficult by heavy rains.

The Board's construction plans for the Taunton and North Devon Area call for a new bulk supply point at Bishop's Hull. This substation is under construction and when completed will provide an improved supply to Taunton and Wiveliscombe and help reinforce the overloaded North Devon network. Later it will be linked with Wellington.

Unfair Competition Again?

THE General Purposes Committee has sent a report to its parent body, the Walsall Chamber of Commerce, deprecating the unfair competition which, it is alleged, electrical contractors were having to meet from the Midlands Electricity Board and the Central Authority. The Chamber has adopted this report and has agreed to recommend its members to give full support to private contractors.

Complaints made included the undercutting of installation tenders for factories, low hire purchase terms and deposits, priority vehicles and advertising on an extensive scale not allocated to its correct department.

N.E. Promised More Power

NORTH Eastern Consultative Council at its last meeting received reports of a meeting between Lord Citrine, chairman of B.E.A. and the Northern Regional Council of the Federation of British Industries at Newcastle-on-Tyne, when the question of electricity supplies was discussed.

Describing steps taken to improve supplies which included commissioning of enough plant during 1949-1955 to increase the present generating capacity by 111%, Lord Citrine added that the plans included not only the completion of Dunston "B" and the North Tees station, but also the building of two new stations. He assured the Council that when these schemes reached fruition and their area became self-supporting there was no intention of "exporting" power at peak periods to other areas.

Claim for Damages Rejected

IN the Ulster High Court recently, Lord Justice Black gave judgment in an appeal by the Electricity Board for Northern Ireland seeking to have set aside an award by the Acting County Court Judge of Antrim of a decree for £75 18s. to J. W. Erskine, of Ballybrakes, Ballymoney, in a claim brought by him against the Board. Erskine had sued for loss and damage which he claimed he had suffered through the negligence of the Board in cutting off the electricity supply to his premises on April 14, 1948, without sufficient notice, as a result of which he lost 862 day-old chicks and had 150 others so injured as to render them unsaleable. The Board argued that Erskine had been given reasonable notice of their intention to cut off the supply temporarily—due to the need to remove a power pole in the vicinity—and that he had sufficient time to make arrangements for the heating of the incubator by alternative means. Erskine said he received less than two hours' notice.

On the authority of a case decided by the Court of Common Pleas many years ago, Lord Justice Black held that Erskine was not entitled to recover damages, and accordingly he reversed the decree and dismissed the plaintiff's case.

NEWS IN BRIEF

Seeboard's East Sussex/S.W. Kent Sub-Area held its first annual sports day at Hawkhurst, Kent, recently. Over 1,000 employees and their friends attended.

The final programme of the third International Mechanical Engineering Congress in Brussels this September is now available. It gives details of the factory tours, lectures and social events in finalised form.

Bridlington is the 106th branch of E.A.W. Formed last month, the branch has as its president, the Mayoress of Bridlington.

Scarborough will be the venue of the annual summer outing which the I.E.E. North Midland Students Section has organised for Sunday, September 10. Members are again invited to bring their ladies and friends. Details are available from Mr. G. A. Heigh, 28 Tom Lane, Crosland Moor, Huddersfield.

The Broadcasting Committee, under the chairmanship of Lord Beveridge, has announced that the hearing of evidence has now been completed.

The Treasury has made the Import Duties (Exemptions) (No. 5) Order, 1950, which exempts from duty unwrought copper imported in the form of billets. This order is effective from August 8.

Electric Supply News

Canterbury

We hear from the South Eastern Electricity Board that the statement made at the General Purposes Committee of the Canterbury City Council, which we reported last week, that discounts for prompt payment of electricity bills are to be discontinued, is not correct. No recommendation has been made to the Board for the withdrawal of these discounts and the Board has made no decision to withdraw them.

North Wales

The Industrial Association of Wales and Monmouthshire is to give full support to the proposed construction of new hydro-electric generating stations in North Wales. Making this announcement after a council meeting, the Association states that they have heard objections to the scheme as explained by Mr. Clough Williams-Ellis. They have received also an assurance from a representative of the B.E.A. with regard to the safeguarding of amenities in North Wales, and after careful consideration the Association has decided to inform the Authority of their support.

Saltcoats

A scheme to reinforce the supply system at Saltcoats, at an estimated cost of £25,000, has been approved by the South West Scotland Electricity Board. It will take two years to complete the scheme. Besides improving the voltage in the area, the scheme will give supplies to certain new consumers who formerly were excluded because the network was overloaded. The high voltage network will be raised from 3,300 V to 11,000 V. Four of the existing substations will be rebuilt and a new substation erected.

South Eastern

Present unit charges of more than 1d. under all domestic and commercial two-part tariffs in the area of the South Eastern Electricity Board, are to be reduced to 1d. In some cases this will mean a reduction of more than ½d. per unit. Simultaneously, fixed charges in Peacehaven and Crawley will be reduced. In Epsom, where ½d. will come off the unit rate, the fixed charges will be slightly increased to bring them nearer to fixed charges in other parts of the Board's area. But the increase should be more than off-set by the lower unit charge. In Ashford (Kent), the existing complicated domestic tariff will be withdrawn, and consumers will have the choice of a cheaper two-part tariff or a new rate of 6d. per unit, in place of the present commencing rate of 9·6d. or more. In Cranleigh, the unit charge under the domestic and commercial two-part tariff will be reduced by 5%, but the 2½% cash discount is being discontinued. These tariff reductions, affecting about 62,000 consumers, are to be put into operation after the meter reading for the September quarter, 1950, following on the financial results of the Board's second year.

South West Scotland

New charges to domestic consumers, by the South West Scotland Electricity Board, will be introduced on October 15. Under the new tariffs, which will replace more than 50 different domestic tariffs at present in operation in the board's area, the charge for primary units will be based on the number of rooms in the consumer's house, a charge of 4d. a unit (6d. in the case of pre-payment meter consumers) being made for the first 10 units per room per quarter. All additional units used will continue to be charged at the present rate of ¾d. per unit.

The new tariffs will apply uniformly throughout the whole of the board's area except in Glasgow and Rutherglen. In view of the low rates enjoyed by former Glasgow Corporation consumers, the board has decided to leave the price of the primary units at 3d. a unit meantime, and to continue that concession also to those consumers in Rutherglen previously charged at the Glasgow rates.

Tiree

Replying to a letter to Major D. M'Callum, M.P. for Argyll, the North of Scotland Hydro-Electric Board has stated that the scheme for supplying electricity to the island of Tiree, which has a population of 1,400, will have to be deferred owing to the present restrictions on the use of materials. The Board had been asked to consider using the generating station built on the island by the R.A.F. during the war, but they state that the plant is not in a good condition, and additional plant or a new station would soon have to be provided. In addition, the cost would be high in relation to the number of consumers.

Wrexham

The B.E.A. has agreed with the Board of Trade to purchase the 12,150 kW generating station on the Marchwill Trading Estate at Wrexham. The station will be operated by the Merseyside and North Wales Division of the B.E.A. as from October 1. At present the station is managed by the Wales and Monmouthshire Industrial Estates Ltd. on behalf of the B.o.T., and is used by the company to supply steam and electricity to factories on the trading estate.

LIGHTING SCHEMES

Denton.—The U.D.C. has received approval to the change-over from gas to electricity of electric lighting in Ashton Road and Stockport Road.

Surrey.—Although no date has been given when the work will be started, the Ministry of Transport has informed local authorities that lighting of the roundabouts on Kingston By-Pass Road will be carried out at the Ministry's expense.

Company Activities

Cables Investment Trust

Profit for year to June 30, after providing for taxation, is £172,506 (*£155,773*). U.K. taxation charged in arriving at profit was £140,155 (*£128,208*), final dividend 3% on Ordinary, making 5% (*same*).

Davey Paxman and Co.

Trading profit for the year to March 31 was £462,845 (*£716,074*), after allowing depreciation £43,613 (*£57,800*) and all expenses of working and management, and adding £805 (*same*) income from investments. Deduct interest payable £3,092 (*£7,831*), capital interest expenses £1,500 (*nil*), profits tax £59,000 (*£86,000*), income tax on year's profit £176,375 (*£310,362*), tax equalisation reserve—further amount of £28,000 in respect of earlier years transferred from contingencies reserve—£7,250 (*nil*), leaving net profit £216,433 (*£305,780*). To plant replacement reserve £25,000 (*£70,000*), stock and general contingencies reserve £50,000 (*£120,000*), pensions reserve £25,000 (*£50,000*), and general reserve £60,000 (*£40,000*), Preference dividend £8,662 (*£4,331*), Ordinary dividend of 10% £28,875 (*£19,250*), leaving £43,082 (*£24,186*) carried forward.

Hackbridge and Hewittic Electric Co.

At this meeting last Thursday, the chairman, Mr. T. F. Lister, reported that while in Canada recently, arrangements were made to extend the firm's facilities by putting down equipment for the manufacture of rectifier bulbs. Some of last year's profit of the wholly-owned subsidiary in Canada will be used to fund this operation.

Morgan Crucible Co.

Preliminary statement shows a group profit for the year to March 31 last, after all charges but before taxation, of £1,135,046 (*£1,195,109*), Final Ordinary dividend is 8¾%, making 12½% (*same*).

Scottish Cables Ltd.

Trading profit for the year to April 30 last was £273,901 (*£254,060*). After providing £134,040 (*£125,085*) for taxation, the net profit is £115,355 (*£104,822*). There is a proposed final ordinary dividend of 20% making 30% (*same*). To general reserve £65,000 (*£76,058*), leaving £21,730 (*£17,575*) carried forward.

Telephone Rentals Ltd.

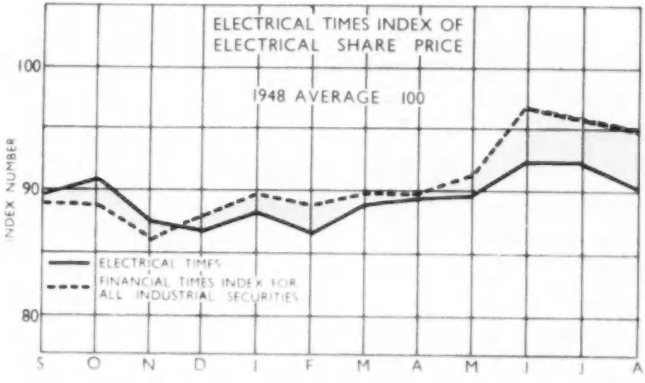
For 1949, group rental revenue was £1,137,191 (*£949,882*), plus profit on trading and miscellaneous £148,186 (*£157,928*), and other income £932 (*£1,390*), making a total of £1,286,309 (*£1,109,200*). To operating costs and other expenses £602,773 (*£531,347*), directors (management and fees) £30,241 (*£28,481*), audit fee £1,281 (*£1,205*), depreciation — installations £249,578 (*£203,973*), properties £2,041 (*£1,933*), office furniture, etc., £12,109 (*£8,992*), leaving profit, before taxation, £388,286 (*£333,269*). To profits tax £115,813 (*£90,360*), overseas taxation £6,307 (*£4,411*), contingencies nil (*£56,718*), supplemental pensions nil (*£10,000*), off goodwill £88,175 (*nil*), to capital reserve of Continental subsidiary £31 (*£33*), to general reserves £20,416 (*£20,000*), preliminary expenses of a subsidiary £501 (*nil*), dividends of holding company: preference £7,661 (*nil*), ordinary interim 4% £22,000 (*same*), final 6% £33,000 (*same*), to employees under participation (gross) £34,740 (*£32,927*), minority interest £1,351 (*£1,220*), leaving carried forward by Telephone Rentals £86,454 (*£81,953*). Subject to the consent of the C.I.C., the directors propose to make a bonus share issue of 400,000 5s. Ordinary shares, by the capitalisation of £100,000 of reserves. There is also a proposal to increase the authorised capital by the creation of 2,000,000 5s. Ordinary shares.

Dividends Declared

Electric Furnace Co. Final dividend of 4½%, making 8% (*both same*).

Tilling-Stevens. No dividend proposed for year to March 31 (7½%).

Some slight drop in electrical share prices have occurred during the last month and probably reflect anxiety over the international situation. However, with the "Electrical Times" index figure at 90.6% of the 1948 average and the "Financial Times" index figure calculated on the same basis equalling 95% prices are still above the average recorded for the preceding twelve months



Commercial Information

CONTRACTS OPEN

HOME

Aug. 14.—Chester - le - Street R.D.C. Electrical installations in 46 houses at Lumley site, 36 at Ouston site and 92 at Barley Mow site. F. Bowman, Architect, Estate Office, Great North Road, Birtley, Co. Durham. Deposit £2 2s.

Aug. 16.—Angus C.C. Street lighting equipment at Edzell and Friockheim, five lamps and columns each, with wiring, etc. County Engineer, County Buildings, Forfar.

Aug. 18.—W. Riding of Yorks C.C. Rewiring at the West Riding Constabulary Headquarters, Back Bond Street, Wakefield. County Architect, County Hall, Wakefield.

Aug. 18.—Belfast. Two vertical axial flow circulating water channel pumps to pump 24,000 g.p.m. at a head of approx. 13 ft; also crane and channel pumphouse equipment for Harbour power station. Merz and McLellan, Consulting Engineers, Carliol House, Newcastle-on-Tyne 1. Deposit £5 5s. (See our July 13 issue.)

Aug. 19.—Jarrow T.C. Electrical installations in 84 flats. H. W. T. Perkins, Borough Engineer, Town Hall, Jarrow.

Aug. 21.—Denton U.D.C. Provision and erection of 118 h.p. mercury vapour lamps and lanterns, together with bracket arms for attachment to existing trolley bus poles on trunk road A57. Engineer and Surveyor, Town Hall, Denton, near Manchester. Deposit £2 2s. (See our Aug. 3 issue.)

Aug. 21.—Ilkley U.D.C. Installation of mercury vapour lighting (42 columns) on trunk road A65, at Burley in Wharfedale. Surveyor, Town Hall, Ilkley. (See July 27 issue.)

Aug. 21.—St. Albans R.D.C. Provision and erection of 53 reinforced concrete columns, brackets and lanterns with 140-W sodium discharge or 250-W mercury lamps in High Street, London Colney. Engineer and Surveyor, 43 Upper Lattimore Road, St. Albans. Deposit £2 2s. (See July 27 issue.)

Aug. 21.—Bradford T.C. (a) Installation of electric lighting, heating and power, and (b) passenger lift at Waterworks Department, 50/52 Darley Street. City Architect, Town Hall, Bradford.

Aug. 21.—Merthyr Tydfil. Eight concrete columns with lanterns, lamps, etc., at Pentrebach. Contractors, Lavender McMillan Ltd., 54 Cheam Common Rd., Worcester Park, Surrey. Deposit £1 1s. See this issue.

Aug. 23.—Dudley T.C. Installation of electric light and power in Council houses. The number of houses eventually involved is approximately 1,500. Only members of E.C.A. or firms on the N.R.E.I.C. Borough Architect's Office, Priory Hall, Dudley.

August 23. — Birmingham Regional Hospitals Board. Revision of mains and sub-mains distribution (Part III) at Dudley Road Infirmary. H. J. Manzoni, City Engineer and Surveyor, Civic Centre, Birmingham. Deposit £2 2s.

Aug. 24.—Crompton U.D.C. Supply and erection of 44 reinforced concrete street lighting columns, with lanterns and 140 W sodium vapour discharge lamps in Rochdale Road. Engineer and Surveyor, Town Hall, Shaw.

August 25.—Stockport T.C. 500 time switches and 500 lanterns, chokes and capacitors for 80 W mercury vapour lighting, also 500 reinforced concrete lighting columns for Class "B" lighting. W. F. Gardner, Borough Surveyor, Town Hall, Stockport. Advertised in this issue.

August 26.—Farnham U.D.C. Three effluent pumps, one sludge pump, with piping, valves, starter panels and wiring. L. H. Starling, Engineer and Surveyor, Council Offices, South Street, Farnham. Deposit £2 2s.

Aug. 26.—Swinton and Pendlebury T.C. Concrete columns, bracket arms, wiring, lanterns, lamps and auxiliary equipment for lighting 2·08 miles of the Manchester-Chorley (A6) Road. Borough Engineer and Surveyor, Town Hall, Swinton, Lancs. Deposit £2 2s.

Aug. 28.—Denbighshire C.C. Electric lighting installation for canteen kitchen and dining-room at Llanrwst Grammar School. Apply to County Architect, Grove Park, Wrexham, by Aug. 23. Deposit £3. See this issue.

Aug. 28.—Northern Ireland Govt. Electrical installation at "D" Factory, Donegall Road, Belfast. Apply to the Ministry (Room 103), Law Courts Building, May Street, Belfast.

Aug. 30.—Dublin. (a) Two (or three) 6-ton electric portal wharf cranes, and (b) two 10-ton electric portal wharf cranes for Dublin Harbour. Engineer's Office, Dublin Port and Docks Board, East Wall Road, Dublin. Deposit £5.

August 31.—Worthing R.D.C. Electrical installations in 40 houses at Addison Square, 24 at Grinstead Avenue and 15 at Wenceling Cottages, Lancing. Housing Manager, 15 Mill Road, Worthing. Deposit £1 1s.

August 31. Dagenham T.C. Various lengths of 660 V and 250 V underground cable, v.i.r., etc. Borough Engineer, Civic Centre, Dagenham.

Sept. 1.—Belfast T.C. 33 kV main cables, auxiliary cables, and accessories for stage 1 of the 33 kV distribution system extensions. Merz and McLellan, consulting engineers, Carliol House, Newcastle-upon-Tyne 1. Deposit £5 5s. (See July 27 issue.)

September 2.—Irvine T.C. Lighting equipment and concrete pillars for installation of sodium lighting on trunk road A.78. Burgh Surveyor, "Heathfield," Kilwinning Road, Irvine.

Sept. 6.—Dublin. New electric lift at St. Bricin's Hospital. J. Tyrrell, secretary, Office of Public Works, Dublin.

Sept. 8.—Bournemouth T.C. Vehicle-actuated traffic signals at Cemetery Junction. Borough Engineer, Town Hall, Bournemouth. Deposit £1 1s.

September 15. Norwich T.C. Two hydro-pneumatically controlled, electrically driven pumping sets. Engineer and Manager, Water Department, City Hall Norwich.

No date stated.—Stanhope Parish Council. Maintenance of metal filament street lighting lamps. N. Brown, Westville, Wearhead.

No date stated.—Dublin. Electrical installation at Nurses' Home, Leopardstown Park Hospital. Office of Public Works, Dublin. Deposit £1.

No date stated.—E. Preston. Electrical installation at Grange county primary school. Borough Engineer and Surveyor, Municipal Building, Preston.

No date stated.—Fife C.C. Electrical work in addition to County Buildings. Apply to J. M. Mitchell, County Clerk, County Buildings, Cupar, Fife, by August 14.

No date stated.—Northamptonshire C.C. Electrical installation, comprising underground feeder and associate switchgear, at St. John's Close, Thorpe Road, Peterborough. Apply to E. G. Phillips, Son and Norfolk, Consulting Engineers, Arskus House, Annesley Grove, Nottingham, by August 14. Deposit £2 2s. Advertised in this issue.

OVERSEAS

*Details of items marked * may be obtained on application to Room 1076, Board of Trade, Thames House, North Millbank, S.W.1, quoting reference.*

August 18.—Tangier. Two diesel driven generating sets, 6-cylinder, 4-stroke, 1,000 r.p.m. diesels, driving 80 kW 220 V 50 c/s alternators, for State Water and Electricity Services. B.o.T. Ref. CRE (IB) 60451/50*.

Aug. 30.—Uruguay. Two calibrating stations for a.c. measures, single phase and 3-phase, of 3 and 4 wires normal current 3 x 220 V, with capacity for three measures each; and an automatic current stabiliser. B.o.T. Ref. CRE(IB) 59549/50.*

Sept. 1.—Norway. Electrical equipment (except turbine and transformers) for the Niingen semi-automatic hydro electric power station. B.o.T. Ref. CRE (IB) 60390/50*.

Sept. 1.—Norway. Complete coupling installation for the Oldereid semi-automatic power station, for Salten Kraftlag, of Bodo. B.o.T. (Ref. CRE (IB) 59619/50).*

Sept. 5.—Australia. Radio beacon equipment and diesel electric generating plant for the Commonwealth Lighthouse Service. The generators needed are two 90 kVA units, and two of 45 kVA, with two switchboards. B.o.T. (Ref. CRE(IB) 60011/50).*

Sept. 7.—Egypt. Power transformers: twenty 150 kVA, forty 300 kVA and three 400 kVA. Chief Inspecting Engineer, Egyptian Govt., 41 Tothill Street, London, S.W.1. Fee £2 1s. per set.

Sept. 22.—Brisbane T.C. Various types and lengths of 11 kV and 600 V impregnated p.c. l.c. underground cable and jointing material. B.o.T. (Ref. CRE (IB) 59978/50).*

Sept. 27.—Queensland. One 200 kVA 33/11 kV step-down transformer, and one 200 kVA 11 kV automatic voltage regulator, for State Electricity Commission. B.o.T. Ref. CRE (IB) 60720/50*.

Sept. 27.—Victoria. 6/6 kV and 22 kV distribution transformers for State Electricity Commission. Agent-General for Victoria, Victoria House, Melbourne Place, London, W.C.2. Deposit £20.

Oct. 3.—Tangier. Two diesel-driven 2,500 kW, 6,000 V, 50 c/s, 3-phase alternators, for the State Water and Electricity Services of the International Administration. B.o.T. (Ref. CRE (IB) 60486/50).*

Oct. 12.—Brisbane. Seven 33 kV metal clad outdoor type reactors for City Electric Light Co. Ltd. B.o.T. (Ref. CRE (IB) 59985/50).*

Oct. 17.—Bloemfontein. Two stoke-fired boiler units and other plant for extensions to No. 2 power station. Tender No. L.847. Merz and McLellan, 32 Victoria St., S.W.1.

Oct. 20.—Brisbane T.C. Ring main switchgear, comprising three 11 kV, 400 A metalclad oil-immersed tee-off fuse switchgear; six ditto with two 400 A isolators and 100 A fuse switch; 36 h.r.c. fuses 250 MVA complying with B.C.C. No. 6 fuse curve, 24 ditto but with fuse curves complying with B.C.C. No. 7, 12 ditto but with fuses to B.C.C. No. 8, and three 11 kV 400 A tee-off circuit breakers with two 400 A isolators. B.o.T. Ref. CRE (IB) 60708/50.

Oct. 25.—New Zealand. Control and protective equipment for Cobb River power station for State Hydro-Electric Department, comprising one six-panel control board, one six-panel relay board, one two-panel metering board, one two-panel miscellaneous board, loose equipment and spares. Contract No. S.C. 2080.

Oct. 26.—Brisbane. 240 V station batteries, chargers and associated switchgear, for Bulimba "B" power station, for City Electric Light Co. B.o.T. (Ref. CRE (IB) 60709/50).*

Your Queries — Answered

"Discus" organ blowers—makers of? C.C.—Watkins and Watson Ltd., 17 White Lion St., London N.1. (18547)

Adaptors, ring main—makers of? J.P.—Dorman and Smith Ltd., Ordsal Electrical Works, Salford, Manchester 5; Nettle Accessories Ltd., Harper Rd., Wythenshawe, Manchester; Wm. Sanders and Co. (Wednesbury) Ltd., Riddings Lane, Wednesbury, Staffs. (18551)

"Ace" inspection lamps—makers of? T.E.—Progress Cables and Accessories Ltd., Regent House, Eversholt St., London, N.W.1. (18556)

"Westclox" clocks—agents for? T.E.—Markt and Co. (London) Ltd., 23 Portpool Lane, E.C.1. (18559)

Combined water heater/cookers—makers of? T.E.—Thermo-Cookers Ltd., 77 Gt. Peter St., London S.W.1; Gillott Electro Steam Cookers Ltd., 28 Queen Anne Gate, S.W.1. (18562)

Electric fan heaters—makers of? F.T.—General Electric Co. Ltd., Magnet House, Kingsway, W.C.2.; H.M.V. Household Appliances Ltd., Blyth Rd., Hayes, Middx.; Collaro Ltd., By-Pass Road, Barking, Essex. (18567)

"Reglo" fluorescent fittings, makers of? T.E.—C.W.C. Equipment Ltd., 25 Manchester Sq., W.1. (18572)

"Lincoln" arc welder, makers of? H.J.—Lincoln Electric Co. Ltd., Broadwater Rd., Welwyn Garden City, Herts. (18576)

The above are selected from questions we have answered this week. If you have a query, send it to us.

CONTRACTS PLACED

Lewisham T.C. Electrical work at the Perry Vale (No. 2) housing scheme. London Electricity Board, £4,447 (recommended); direct labour, £4,921; J. H. Plant, Ltd., £4,933; Pinching and Walton, £5,074; Edmundsons Electric Co., Ltd., £5,365; Brakefields, Ltd., £5,416; Thorpe and Thorpe, Ltd., £5,447; Requirements Electrical and Engineering, Ltd., £6,141; Hartley Electromotives, Ltd., £6,498.

Manchester T.C. Electrical installations in 787 houses at Woodhouse Park and Mosshook, A. E. Sudlow and Co., Ltd.; S. W. Wainwright and Co., Ltd., E. M. Evans and Son Ltd., and H. C. Taylor and Co. Renewal of electrical installation at Margaret Barclay Residential School and Whitworth Buildings, Openshaw Technical School, Casson Electric Co. Ltd.

Newbury T.C. Electrical installation at the Corn Exchange, R. J. Hewett (Newbury) Ltd., £1,971.

Rochford R.D.C. (Essex). Electrical installation of 67 dwellings, Central Electric Supply Co., £1,163.

Sheffield T.C. Electrical installation in 198 houses at Parson Cross Estate, M. B. Munks. £3,538.

South Shields T.C. Rewiring of Dean Road County Secondary School, A. Robertson Ltd. £1,830.

Tynemouth T.S. Electric lighting equipment for the new Collingwood Junior Mixed and Infants' School, Electric Equipment Ltd. £6,022.

TRADE NOTES

Beama Contract Price Adjustment Formulae.—For purposes of calculating variations in: (a) "Rates of Pay," the rate of pay for adult male labour at July 8, 1950, shall be deemed to be 115s.; (b) "Costs of Material," the index figure for Intermediate Products last published by the Board of Trade on July 8, is 285.2 and is the figure for the month of June, 1950.

Mexico Imports.—Under a recent Mexican Order, electric transformers, switches and instrument boards are added to the list of goods, the importation of which is subject to licence.

Annual Holiday.—The Congleton works of Micramatic Ltd. will be closed from August 12 to 21. The head office at Bournemouth will operate as usual.

Brazil Import.—The Export and Import Bureau of the Bank of Brazil is inviting proposals for the importation of clothes washing machines up to the limit effected in 1948 or 1949, under a barter arrangement. The quota may be double in the case of unassembled machines.

Indian Imports.—In amplification of the earlier notice that no licences will be granted for inessential domestic appliances, the Indian Ministry of Commerce has announced that no licences will be issued for hair dryers, neon sign transformers desk lamps, or electric guitars. In addition, no licences will be granted for imports from dollar or hard currency areas for electric cooking devices, water heaters, boilers and immersion heaters, room heaters, fires or elements therefor, sterilizers, irons, fluorescent starters and sockets, battery chargers, wire, disc or tape recorders, dynamometers, electric clocks, road traffic signalling apparatus, cathode ray oscillographs, cable testing equipment, phase shifters, rotary p.f. meters, vulcanisers, electric watch cleaning machines, and wireless transmitters and parts.

PRICES OF CABLE METALS AND OTHER MATERIALS
(at Tuesday night)

	£ s. d.	New York price
COPPER, electrolytic	186 0 0	£180 0 0
Delivered in 2nd and 3rd month after order	187 10 0	—
Delivered in 4th, 5th and 6th month after order	189 0 0	—
LEAD, good soft pig (foreign)	96 0 0	96 0 0
" "English" quality	97 10 0	—
Delivered in 2nd and 3rd month after order, plus	1 0 0	—
TIN (99-99.75—) (Cash)	754-755	—
(3 months)	747-748	—
ALUMINIUM, commercial purity (del.)	112 0 0	—
ZINC	127 10 0	120 0 0
ARMOURING:		
Galv. Steel Wire (0.104 in.)	43 5 0	—
Mild Steel Tape (0.04 in.)	26 0 0	—

GAZETTE ANNOUNCEMENTS

COMPANIES ACTS

A. R. Burns and Son, Ltd. Resolution for voluntary winding up passed at meeting on July 28, Mr. J. S. Bradley-Hole, 6/7 Old Steine, Brighton 1, appointed liquidator, to whom creditors should send particulars by August 31.

Caersws Electric Supply Co. Ltd. Creditors to send particulars to D. R. Morgan, liquidator, 51-52 Broad Street, Newtown, Montgomeryshire, by August 19.

Rushlite Batteries Ltd. Meetings of members and creditors at office of H. L. Blower, joint liquidator, 4 Princess Street, Wolverhampton, on September 1 at 10.15 a.m. and 10.30 a.m. to receive report on winding-up.

Voluntary Liquidation

Riley and Peirson (Electrical) Ltd., Eastgate, Bramhope, near Leeds. A statement of affairs was submitted at a recent meeting of creditors showing liabilities amounting to £2,724. Assets were estimated to produce £1,034, and after allowing £23 for preferential claims, there were net assets of £1,011, or a deficiency of £1,712. The company was registered in May 1947, with a nominal capital of £1,500, of which £800 had been issued, and acquired an existing business which was commenced in February, 1946. Trading accounts prepared for the first year to June 30, 1948, showed sales of £6,682, and a net profit of £578, but in the following year on sales of £4,254 there was a net loss sustained of £189. In order to assist creditors, the chairman stated that one shareholder who was a creditor for £327 had decided to waive his claim, and another shareholder would reduce his claim from £582 to £200. A resolution was passed confirming the voluntary liquidation of the company with Mr. R. B. Smith, of 3 Alfred Street, Leeds, as liquidator, with a committee of inspection.

BANKRUPTCY ACTS

Intended Dividend

Birmingham. Robinson, Frank, refrigerating and electrical engineer, 100 Henshaw Road, Small Heath. Last day for receiving proofs August 16. Trustee, Mr. R. K. Clark, Somerset House, 37 Temple Street, Birmingham.

BUSINESS PROSPECTS

HOME

Birmingham T.C. Erection of 56 houses and maisonettes at Bordesley Green East, Stechford. H. J. Manzoni, engineer and surveyor, Civic Centre.

Blackburn T.C. Erection of 90 houses at Green Lane estate. Borough Engineer, Town Hall.

Bollington U.D.C. Erection of 12 houses at Grimshaw Lane. A. Clough, Clerk of the Council.

Bournemouth T.C. Erection of 20 houses at East Home Lane, Leybourne estate. Borough Architect, Room 98, Town Hall.

Canterbury T.C. Erection of 40 houses at Martyrs Field site. L. H. Wilson, City Architect, Municipal Buildings.

Cambridge T.C. Erection of 56 flats at Newmarket Road (West) estate. Engineer and surveyor, Guildhall.

Chapel-en-le-Frith R.D.C. Erection of 19 houses at Bamford. Architects, Pendleton and Dickinson, 16 Brazennose Street, Manchester.

Church Stretton U.D.C. Erection of 36 houses at Prosser's Yard site. Quantity surveyors, Silk and Frazier, 35 Portland Road, Edgbaston, Birmingham.

Cuckfield R.D.C. Erection of 24 dwellings at Scaynes Hill and ten at Copthorne. A. Hutchings, engineer and surveyor, R.D.C. Offices, Boltro Road, Haywards Heath.

Darlington T.C. Tenders being obtained for electrical work in connection with the Salters Lane Open-Air School. About 77 lighting points will be provided. Plans by borough architect, Central Buildings, Darlington.

Derbyshire C.C. Classroom extension at Staveley Hollingwood C. School. County architect, St. Mary's Gate, Derby.

Hambledon R.D.C. Erection of 46 houses, bungalows and flats at Cranleigh and Thursley. Engineer and surveyor, Council Offices, Bury Fields, Guildford.

Letchworth U.D.C. Erection of 41 houses at Grange Estate. Surveyor, Council House.

Lincolnshire C.C. Erection of three-form entry junior school at Lincoln Gardens, Scunthorpe. A. R. Clark, County architect, County Offices, Lincoln.

Litherland U.D.C. Erection of 36 flats at Field Lane. Engineer and surveyor, Town Hall.

Llandudno U.D.C. Erection of 14 houses at six flats at Conway Road. J. A. Edwards, engineer and Surveyor, Town Hall.

London. Plans being prepared for extension to the Victory (Ex-Services Club), 73 Seymour Street, W.1. Architect, A. A. Rayman, of Alister Macdonald, 10 Bedford Street, W.C.2.

Milford Haven U.D.C. Erection of 56 houses at Observatory Estate, adjoining Gellyswirk Road, Hakin. Engineer and surveyor, Town Hall.

Neath T.C. Erection of 36 houses at Cimla No. 2 site. Borough Engineer, Gwyn Hall.

Oswestry T.C. Erection of 30 houses at Shrewsbury Road site. J. E. Taylor, borough surveyor, Guildhall.

Northumberland. Allerdene Hill, Tankerville Terrace, Jesmond, Newcastle-on-Tyne, are quantity surveyors by the C.C. for the proposed Seaton Burn County Modern School. Architects are Cackett, Burns Dick and McKellar, 21 Ellison Place, Newcastle-on-Tyne.

Pickering R.D.C. Erection of 18 houses at three sites. Architect, H. Smith, Burgate Chambers, Pickering.

Rawmarsh U.D.C. Erection of 24 houses at Monkwood Housing estate. J. R. S. Creighton, surveyor, Council Offices, Parkgate, Yorks.

Redditch U.D.C. Erection of 18 Old People's dwellings at Batchley Estate. E. Buckley, engineer and surveyor, Council House.

South Shields. Newcastle-on-Tyne Regional Hospital Board, "Durnre," Osborne Road, Newcastle-on-Tyne, has approved in principle proposed additions to South Shields General Hospital. The work will include extensions to X-ray department, provision of children's and physiotherapy department, modernisation and extension of the main kitchen, provision of a twin-operating theatre unit and an ear, nose and throat unit. P. H. Knighton, M.B.E., A.R.I.B.A., is the Board's chief architect.

Southwick U.D.C. Erection of 10 flats at "Kingsfield," The Green, engineer and surveyor, Town Hall.

Stalybridge T.C. Erection of 50 houses at Buckton Vale site. P. W. Musther, Town Clerk, 127 Stamford Street.

Stevenage. Erection of houses, shops and flats. Apply to Chief Administrative Officer, Stevenage Development Corporation, Aston House, Aston, near Stevenage.

Stockton-on-Tees.—The Education Committee is to spend £2,145 extending the electric tubular heating system at the Bailey Street school.

Sunderland. North - Eastern Metal Fabrications, Ltd., are to extend their premises in Hopper Street, Sunderland, and have prepared their own plans. The borough architect (H. C. Bishop), Grange House, Stockton Road, has prepared plans for alterations and additions to Mowbray Villas, and 16 houses at Pennywell for the T.C. Vaux and Associated Breweries, Sunderland, are to convert a warehouse in Castle Street and Dunning Street in to a mineral water factory.

Sussex C.C. Erection of East Grinstead County Primary School (Infants). J. Catchpole, County Architects, County Hall, Lewes.

Tunbridge Wells T.C. Erection of 48 flats. H. P. Bishop, surveyor and water engineer, Town Hall.

Wainford R.D.C. Erection of 8 bungalows and 2 houses. Meeen and Collis, Architects, Station Road, Beccles.

Vaynor and Penderyn R.D.C. Erection of 34 houses at Hirwaun. R. H. Rose, Clerk of the Council, 25 Victoria Street, Merthyr Tydfil.

Weston-super-Mare T.C. Erection of 17 aged persons' bungalows at Summerlands Estate. J. R. Freer-Hewish, Engineer and Surveyor.

OVERSEAS

Canada. R. P. Allsop of 1221 Bay St., Toronto, are interested in learning what United Kingdom equipment in the following categories is available for the Canadian market: electric lighting fixtures, boilers and associated equipment, air-handling fans, etc.

Hong Kong. Francois d'Hardvilliers Ltd., 5 Queens Road, Central Hong Kong, are interested in obtaining various electrical machinery, including motors, generators, transformers, cables and other equipment for power generation and distribution.

India. Jyoti Ltd., Baroda, desire to associate with a U.K. manufacturer of electric motors in order to gain technical experience and possibly to share stocks. Enquiries to L. M. Krishnan at that address.

NEW COMPANIES

Extracted from the Register issued by Jordan and Sons, Ltd., 116 Chancery Lane, London W.C.2.

L. H. Durrant and Co., Ltd., 330 High St., Harborne, Birmingham. To take over business of radio and electrical goods dealers and contractors carried on as "L. H. Durrant and Co." at Harborne, Birmingham. Cap.: £5,000. Dirs.: L. H. Durrant and Mrs. M. T. Durrant, Westacre, Aise Lane, Droitwich.

Electronic Service (Hallamshire), Ltd., 93 Button Lane, Sheffield. To take over business of a tape recorder and television apparatus manufacturer carried on at Sheffield by David Sockett. Cap.: £5,000. Dirs.: D. Sockett and E. G. Summers.

Elvin and Murray-Forbes Television Diffusion, Ltd., 21a Railway Rd., Blackburn. Cap.: £1,000. Dirs.: E. S. Murray-Forbes, Flat 76a Dukes Brow, Blackburn; J. K. Elvin, 19 Kimberley St., Blackburn; H. G. Thackery and F. Norman.

Geni Lamps, Ltd., 25 Millbank, Westminster, S.W.1. Cap.: £100. Dirs.: B. Stern, 25 Millbank, S.W.1; J. D. Vanstone, 16 Minchenden Cres., Southgate, N.14.

House of Peter Marsh, Ltd., 71 Temple Row, Birmingham 2. Manufacturers of and dealers in decorated lamps, wrought iron handcraft, etc. Cap.: £150. Dirs.: G. H. P. Drewitt, 6 Chantry Rd., Moseley, Birmingham 13, C. H. Clover, 136 Marsh Hill, Erdington, Birmingham 23, and E. G. Parkes, 14 Everest Rd., Handsworth Wood, Birmingham 20.

W.H. Instruments, Ltd. Manufacturers of and dealers in electronic and precision instruments, etc. Cap.: £100. Dirs.: To be appointed by subs. Subs.: H. A. R. Holland, Old Manor House, Littleton, Shepperton, Mdx.; I. R. Worsley, 139 Latchmere Lane, Kingston-on-Thames.

Jones Morris and Co., Ltd., 394 Barlow Moor Rd., Chorlton, Manchester 21. Electrical engineers, etc. Cap.: £3,000. Dirs.: E. M. Jones, Clara Jones and F. W. Jones, all of 12 Oak Avenue, Chorlton, Manchester 21.

Mortimer Engineering Co., Ltd., 37 Soho Sq., W.1. Cap.: £100. Dirs.: E. J. Guiterman, 102 Dollis Hill, N.W.2, P. Dew, O.B.E., 1 Sloane Gdns., S.W.

Nucleonic and Radiological Developments, Ltd., Baltic House, Leadenhall St., E.C.3. Cap.: £10,000. Dirs.: To be appointed by subs. Subs.: H. E. Armstrong, 65 Brook Cres., Chingford, E.4; L. P. Hadley, 106 Wyatt Park Rd., Streatham Hill, S.W.2.

T. A. C. (Bournemouth), Ltd., Upper Hinton Chambers, Upper Hinton Road, Bournemouth. Heating, ventilating, lighting, mechanical, electrical and general engineers, etc. Cap.: £1,000. Dirs.: Lord Ventry, Lindsay Hall, Lindsay Rd., Westbourne, Bournemouth; A. C. Leith, 1 Lystra Rd., Moordown, Bournemouth; M. Cromey-Hawke and Sqdn. Ldr. T. P. York-Moore.

Wm. Hodgkins and Co., Ltd., 19 St. George St., Leicester. To carry on, extend and turn to account the business of electrical engineers and wholesalers (being the business formerly carried on by Wm. I. Hodgkins as "Wm. Hodgkins and Co." at 19 St. George St., Leicester). Cap.: £5,000. Dirs.: W. I. Hodgkins and H. S. Kirk.

S. F. Appliances (England) Ltd. Manufacturers of and dealers in cooking, heating and lighting appliances, etc. Cap.: £10,000. Dirs.: Not named. Subs.: R. A. Clark and B. C. G. Elliott, 18 Austin Friars, E.C.

Parry's Electrical Co. (Manchester) Ltd., 89 Windsor Road, Prestwich, Lancs. Cap.: £500. Dirs.: R. C. Parry and Sophia Parry, 106 Windsor Road, Prestwich, Lancs.

TRADE MARKS

This information is extracted from the Official Journal by permission of the Controller.

Aetna. 680,217. Class 17. Electrical insulators. Colton Electrical Equipment Co. Ltd., 198 Blackstock Road, Highbury Vale, N.5.

Alwex. 686,810. Class 9. Electrical apparatus. Allen West and Co. Ltd., Lewes Road, Brighton 7.

Crosan. 687,709. Class 7. Electricity generators operated by diesel engines. Cross and Sankey Ltd., 96/100 Victoria Street, London S.W.1.

Ceramicon. 670,306. Class 9. Ceramic electrical condensers. Erie Resistors Ltd., 2 Carlisle Road, The Hyde, Hendon, N.W.9.

Manotron. 686,264. Class 9. Mechanisms embodying Manometric and electronic apparatus for use in supervising or controlling the operations of machinery. B. G. (London), Ltd., 17 Stratford Place, London W.1.

Murella. 688,818. Class 11. Lampshades. M. F. Mayer, 12a Henley Court, Watford Way, Hendon, N.W.4.

Nine Lives (with design). 686,565. Class 9. Electric dry batteries. Union Carbide and Carbon Corpn., 30 East 42nd St., New York.

Pagivolt. 685,622. Class 9. Mechanical and luminous display signs. Pagivolt Co., 203 Corkerhill Road, Glasgow S.W.2.

Pyod. 688,998. Class 9. Thermo-electric couples for pyrometers. Foxboro-Yoxall Ltd., Lombard Road, Morden Road, Merton, S.W.19.

Siloluxe. 687,460. Class 9. Vacuum cleaners. C.C.A. (Vacuum Cleaners) Ltd., 109 South Street, Ponders End, Enfield, Middx.

S in circle. B682,934. Class 11. Electric handlamps. Wm. Sanders and Co. (Wednesbury) Ltd., Falcon Electrical Works, Riddings Lane, Wednesbury, Staffs.

TEC in oval. 678,418. Class 9. Transformers, choke coils and convectors. Transformer and Electrical Co. Ltd., Eastern Works, Eastern Road, Walthamstow, E.17.

MEETINGS TO NOTE

TUESDAY, AUGUST 15

A.S.E.E. (S.W. London branch).—"Television," C. E. Juggins. Compton Hall, Compton Road, Wimbledon, S.W.19.—8.15 p.m.

WEDNESDAY, AUGUST 16

A.S.E.E. (Manchester branch).—Brains Trust. Engineers' Club, Albert Square, Manchester. 7.30 p.m.

MONDAY, AUGUST 28

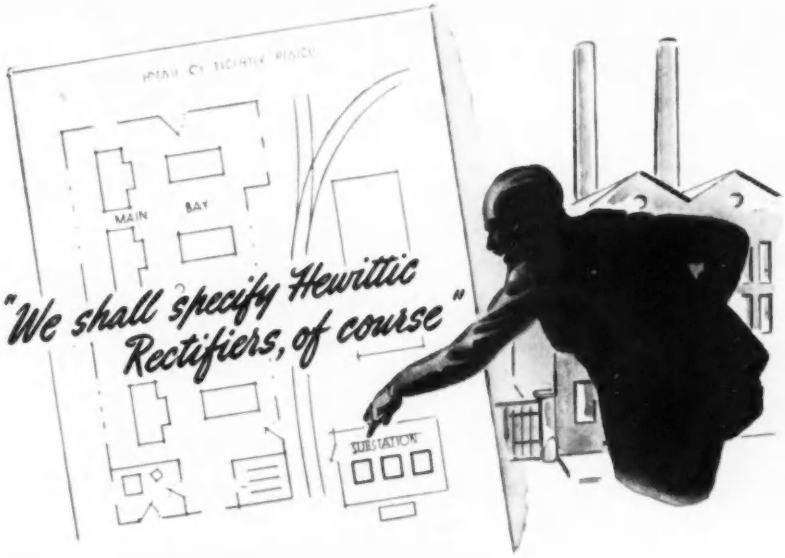
SUBMARINE CABLE CENTENARY.—Exhibition opens at Science Museum, South Kensington, London.

WEDNESDAY, AUGUST 30

BRIT. ASSN.—Annual meeting, Birmingham.

INDUSTRIAL FINISHES EXHIBITION.—Earl's Court. Till September 7.

BRITISH ASSOCIATION.—Annual meeting. Till September 6. Birmingham.



Hewittic Rectifiers

REGD. TRADE MARK

FOR D.C. supply to industrial works . . . to operate cranes and conveyors, all variable speed D.C. motor-driven machinery, magnetic equipment, electrolytic plant . . . it is obviously wise to specify converting plant that is supremely reliable, easily installed in the smallest possible space, highly economical, requires negligible maintenance and operates COMPLETELY UNATTENDED.

These requirements are fully met by HEWITTIC RECTIFIERS, which are supplied up to any capacity, for the heaviest service, e.g., operating steel rolling mills and electric traction systems, or in small units for such applications as battery charging for works electric vehicles.

Hewittic rectifiers are also ideal to replace obsolete rotary converting plant or local D.C. generating equipment, providing a greater D.C. output in the same floor space.

the *proved* plant for D.C. industrial supply

Send for Publication R.222.

HACKBRIDGE AND HEWITTIC ELECTRIC CO. LTD., WALTON-ON-THAMES, SURREY

Telephone: Walton-on-Thames 760 (8 lines) Telegrams: "Electric," Walton-on-Thames

METALLIC *makes the job straightforward*

There is enough trouble these days without asking for it. Make sure of trouble-free electrical installations by specifying Metallic Conduit Tube and Fittings. their quality and consistent accuracy are unequalled.

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THE METALLIC SEAMLESS TUBE CO. LTD., LUDGATE HILL, BIRMINGHAM 3. TEL: CEN 7167
Also at London, Newcastle-on-Tyne, Leeds, Swansea and Glasgow

CLASSIFIED ADVERTISEMENTS

OFFICIAL TENDERS AND APPOINTMENTS

WANTED - FOR SALE WORK WANTED

Those wishing to advertise in these pages should send the text to the Classified Advertisement Dept., Electrical Times, Sardinia House, Sardinia St., W.C.2, before 10 a.m. on TUESDAY of week of issue. Official Displayed Advertisements are charged at 35s. per inch, and all other classified advertisements at 2s. 6d. per line. Situations wanted will be published four times for twice the single insertion rate. Fee for Box No. and postage on replies is 2s.

PUBLIC NOTICES

W. T. HENLEY FELLOWSHIP

THE Governors of Queen Mary College invite applications for a W.T. HENLEY FELLOWSHIP. The Fellowship is tenable for two years and may be extended for a third year. The successful applicant will be expected to do research work in electrical engineering and the college facilities are particularly good for research work in dielectrics, high voltage engineering and arc-interruption phenomena. Remuneration £400 to £600 per annum depending on applicant's qualifications.

Applications, which should be received before September 15, should be sent to the Registrar, Queen Mary College (University of London), Mile End Road, London E.1. (F 591)

TENDERS INVITED

DENBIGHSHIRE EDUCATION AUTHORITY

School Meals Service

TO ELECTRICAL ENGINEERS

CONTRACTORS desirous of submitting a Tender for the following works, viz.:—

Llanrwst Grammar School. Proposed erection of Canteen Kitchen and Dining-room in Ministry of Works prefabricated hutting.

Electric Lighting Installation. Tender based on plans and specification

Are invited to forward their names, together with a deposit of £3 (three pounds) (which will be returned on receipt of a bona fide tender), to the County Architect, Grove Park, Wrexham, not later than Wednesday, the 23rd day of August, 1950.

No application to tender will be accepted after this date.

The deposit cheque is to be made payable to the "Denbighshire Education Authority," and crossed "Midland Bank, Ltd."

The specification and plans will be despatched to Contractors desirous of tendering on or about the 28th day of August, 1950.

The lowest or any tender will not necessarily be accepted, nor will any allowance be made for estimates.

W. E. BUFTON,
Clerk of the County Council.

County Offices, Ruthin.
August 2, 1950. (F 592)

COUNTY BOROUGH OF STOCKPORT

TO MANUFACTURERS OF REINFORCED CONCRETE STREET LIGHTING COLUMNS

THE General Purposes Committee invites Tenders for the supply of 500 Reinforced Concrete Lighting Columns, Class "B" Lighting.

Specifications, and Forms of Tender may be obtained and General Conditions seen on application to the undersigned.

Tenders addressed "The Chairman of the General Purposes Committee, c/o the Borough Surveyor, Town Hall, Stockport," sealed and returned in the envelope provided, to be left at my office, at or before 10 a.m. on Friday, August 25, 1950, and the envelope shall not bear any name or mark indicating the sender.

The Committee do not bind themselves to accept the lowest or any Tender.

WILLIAM F. GARDNER, M.I.C.E.,
Borough Surveyor.

Town Hall,
Stockport. (F 558)

MERTHYR SLIP ROAD

GROUP 'A' LIGHTING SCHEME

Tenders are invited for the erection of eight concrete columns complete with lanterns, lamps, etc., at Pentrebach, Merthyr Tydfil, Glam.

Specifications and drawings may be obtained from the principal contractors.

LAVENDER McMILLAN, LTD.,
54 Cheam Common Road, Worcester Park, Surrey,
on payment of One Guinea.

Deposit to be refunded upon receipt of a bona fide tender and the return of all documents.

Form of sub contract agreement can also be inspected at the above address or at our Site Office at Mountain Hare, Merthyr Tydfil, Glam. Tenders to be submitted to the undersigned in a plain sealed envelope endorsed "Tender for Lighting Pentrebach Roundabout" not later than noon on Monday, August 21.

The principal contractors do not bind themselves to accept the lowest or any tender.

The Secretary
LAVENDER, McMILLAN, LTD.
54 Cheam Common Rd., Worcester Park, Surrey. (F 595p)

SOKE OF PETERBOROUGH COUNTY COUNCIL

St. John's Close, Thorpe Road, Peterborough

ELECTRICAL INSTALLATION

TENDERS are invited from Qualified Registered Electrical Contractors for electrical installation comprising underground feeder cable and associate switchgear, to be carried out at St. John's Close, Thorpe Road, Peterborough.

Persons wishing to tender may obtain full particulars of the work involved, also the necessary Form of Tender, reference plan and specification from Messrs. E. G. Phillips Son and Norfolk (the Council's Consulting Engineers) of Arskus House, Annesley Grove, Nottingham, provided application therefor is made by August 14, 1950, accompanied by a deposit of £2 2s. made payable to the Soke of Peterborough County Council which will be returned on receipt of a bona fide tender.

Tenders enclosed in a plain sealed envelope endorsed "Tender for Electrical Installation St. John's Close," must be delivered to the Clerk of the County Council at the address given below within fourteen days after the above particulars and forms have been dispatched by the Consulting Engineers.

Neither the lowest nor any tender will necessarily be accepted.

ERIC P. SMITH,
Clerk of the County Council.

County Council Offices,
Bridge Street,
Peterborough.
August 1, 1950. (F 557)

BOX No. replies to be addressed to the ELECTRICAL TIMES, Sardinia House, Sardinia Street, London W.C.2

COUNTY BOROUGH OF STOCKPORT

STREET LIGHTING

THE General Purposes Committee invites Tenders for the Labour and Materials required in:—(1) Supply of 500 Time Switches; (2) Supply of 500 Lanterns, Chokes and Capacitors for 80 Watt Mercury Vapour Lighting.

Specifications and Forms of Tender may be obtained for each of the above contracts and General Conditions seen on application to the undersigned.

Tenders addressed "The Chairman of the General Purposes Committee, c.o the Borough Surveyor, Town Hall, Stockport," sealed and returned in the envelope provided, to be left at my office, at or before 10 a.m. on Friday, August 25, 1950, and the envelope shall not bear any name or mark indicating the sender.

The Committee do not bind themselves to accept the lowest or any Tender.

WILLIAM F. GARDNER, M.I.C.E.,
Borough Surveyor.

Town Hall,
Stockport. (F 559)

APPOINTMENTS VACANT

YORKSHIRE ELECTRICITY BOARD

No. 6 (Hull) Sub-Area

APPLICATIONS are invited for the following appointment :—

THIRD ASSISTANT ENGINEER (Goole district). Vacancy No. 44/50.

Applicants should have had experience in planning, estimating, and construction of overhead lines and substations, and in the operation of an extensive system in a rural area.

Preference will be given to candidates possessing the A.M.I.E.E., Grad.I.E.E., or holding exempting qualification.

The successful candidate will be required to undertake standby duty and reside in Pocklington in the Goole District.

Salary, N.J.B. Schedule, Class " D," Grade 9, £494-£510 per annum.

Applications, stating the above vacancy number, and giving full details of age, qualifications, and experience, should be forwarded to the Manager, No. 6 (Hull) Sub-Area, Yorkshire Electricity Board, Ferensway, Kingston-upon-Hull, within fourteen days of the appearance of this advertisement. (F 600)

NORTH WESTERN ELECTRICITY BOARD

Area Board Headquarters

APPOINTMENT OF ENGINEERING DRAUGHTSMAN

APPLICATIONS are invited for the appointment of Engineering Draughtsman at Area Board Headquarters, Cheetwood Road, Manchester 8.

Applicants should have had a good technical training and drawing office experience in the electrical design, layout and detailing of indoor and outdoor sub stations up to and including 33,000 volts, together with the preparation of protection system schematic and wiring diagrams.

Preference will be given to those candidates who hold the Ordinary and or Higher National Certificates.

The provisional salary will be within the range— £400/£500 per annum and will be subject to negotiation with the appropriate body.

Applications stating age, qualifications, training and experience, present post and salary, should be received by the Establishment Officer, The North Western Electricity Board, Cheetwood Road, Manchester 8, not later than Saturday, August 26, 1950. (F 561)

BRITISH ELECTRICITY AUTHORITY

South Western Division

STATION SUPERINTENDENT—NEWTON ABBOT GENERATING STATION

APPLICATIONS are invited for the position of Station Superintendent at Newton Abbot Generating Station. Salary and conditions will be in accordance with the N.J.B. Schedule, Class "F," Grade 1, £660-£1,045 per annum.

Candidates should have received a thorough technical and practical training followed by wide experience in the operation and maintenance of Generating Station plant. The ability to control technical, operating and administrative staff is also essential.

Preference will be given to candidates who are Corporate members of either the Institution of Mechanical or Electrical Engineers, or who hold an equivalent qualification.

The appointment will be superannuable under the British Electricity Authority and Area Boards' Superannuation Scheme.

Applications stating age, qualifications, experience, present appointment and salary should be addressed to the Divisional Secretary, British Electricity Authority, South Western Division, 26 Oakfield Road, Bristol 8, so as to be received not later than Monday, August 21, 1950.

R. C. BARRETT,
Divisional Secretary.

July 31, 1950. (F 563)

BRITISH ELECTRICITY AUTHORITY

South Western Division

SHIFT CHARGE ENGINEER—PLYMOUTH "A" GENERATING STATION

APPLICATIONS are invited for the position of Shift Charge Engineer at Plymouth "A" Generating Station. Salary and conditions will be in accordance with the N.J.B. Schedule, Class "F," Grade 7, at present £625-£643 per annum.

Applicants should have good technical experience, a sound knowledge of the operation and maintenance of generating plant, and preference will be given to applicants possessing the Higher National Certificate or equivalent qualification.

The appointment will be superannuable under the British Electricity Authority and Area Boards' Superannuation Scheme.

Applications, stating age, qualifications, experience, present appointment and salary, should be addressed to the Divisional Secretary, British Electricity Authority, South Western Division, 26 Oakfield Road, Bristol 8, so as to be received not later than Monday, August 14, 1950.

R. C. BARRETT,
Divisional Secretary.

August 1, 1950. (F 564)

NORTH WESTERN ELECTRICITY BOARD

No. 1 Sub-Area

APPOINTMENT OF DRAUGHTSMEN

APPLICATIONS are invited for the appointment of Draughtsmen in the Sub-Area Drawing Office at the Town Hall, Manchester.

Applicants should have had a good technical training and drawing office experience in the electrical design, layout and detailing of indoor and outdoor sub stations up to and including 33,000 volts, together with the preparation of protection system schematic and wiring diagrams.

Preference will be given to those candidates who hold the Ordinary and or Higher National Certificates.

The provisional salary will be within the range £300-£500 per annum according to qualifications and experience, and will be subject to negotiation with the appropriate body.

Applications stating age, qualifications, training and experience, present post and salary, should be received by the Sub Area Secretary, The North Western Electricity Board, No. 1 Sub-Area, Town Hall, Manchester, P.O. Box 493, not later than Saturday, August 19, 1950. (F 560)

BRITISH ELECTRICITY AUTHORITY

East Midlands Division

STOCKTAKER

APPLICATIONS are invited for the position of Stocktaker at this divisional headquarters.

The successful applicant should have first-class knowledge of electrical stores as applied to generating stations and transmission lines, and must be prepared to travel throughout the East Midlands area for the purpose of taking stock at various locations.

The salary will be in accordance with Grade 2 (£390-£450) of the National Joint Council Agreement, and the position will be superannuable.

Applications must be submitted on the appropriate form which can be obtained from the Divisional Establishments Officer, at the undermentioned address, and when completed, should be delivered not later than August 14, 1950.

W. S. BURGE,
Divisional Controller.

British Electricity House,
Barker Gate, Nottingham. (F 504)

BRITISH ELECTRICITY AUTHORITY

Eastern Division

APPLICATIONS are invited for the following appointment:—EFFICIENCY ENGINEER—LITTLE BARFORD GENERATING STATION. Salary in accordance with the revised N.J.B. Schedule, Grade 7, Class "G," (£651-£679 per annum), but may be subject to negotiation through the N.J.B.

Applicants should hold Associate Membership Qualifications of the Institutions of Mechanical or Electrical Engineers or other equivalent qualifications and have had previous experience in a large Generating Station.

A thorough knowledge of instrument maintenance and calibration is desirable and preference will be given to candidates who have had experience with P.F. equipment.

The successful applicant will be responsible for ensuring that all sections of the Generating Station Plant attain efficiency and economy of operation, the preparation of statistics and the keeping of technical records.

The appointment will be Superannuable in accordance with the British Electricity Authority and Area Boards Superannuation Scheme.

Applications stating age, experience and present position should be sent to the Divisional Controller, British Electricity Authority, Eastern Division, Northmet House, Southgate, N.14, to arrive not later than August 18, 1950. Envelopes should be endorsed "Efficiency Engineer—Little Barford."

W. N. C. CLINCH,
Controller.

Northmet House,
Southgate, N.14 (F 580)

BRITISH ELECTRICITY AUTHORITY

South Western Division

GENERAL ASSISTANT ENGINEER—
TELECOMMUNICATIONS SECTION
DIVISIONAL HEADQUARTERS—BRISTOL

APPLICATIONS are invited for the appointment of a General Assistant Engineer in the Telecommunications Section at Divisional Headquarters, Bristol.

The salary will be in accordance with the National Joint Board Revised Agreement, Class "AX.DX," Grade 8, £437-£622 per annum.

The appointment will be subject to the provisions of the British Electricity Authority and Area Boards' Superannuation Scheme.

Applicants should have had a sound general education and practical experience of Communication equipment. They should be either Graduates of the I.E.E. or possess the City and Guilds Final Certificate in Telecommunications. Experience of circuit design or manufacture will be considered an advantage.

Applications stating age, qualifications, details of experience and present salary should be addressed to the Divisional Secretary, British Electricity Authority, South Western Division, British Electricity House, 26 Oakfield Road, Bristol 8, to arrive not later than August 21, 1950.

R. C. BARRETT,
Divisional Secretary.

August 1, 1950. (F 565)

SOUTH EASTERN ELECTRICITY BOARD

ASSISTANT METER ENGINEER
Central Sussex District

SALARY of £550 under Class "E," Grade 8, of the N.J.B. Schedule. Applicants should be experienced in the repairing, testing, and calibration of all types of meters and instruments and must be conversant with the requirements of the Electricity Supply (Meters) Act, 1936. Preference to candidates holding the Higher National Certificate in Electrical Engineering or equivalent qualifications.

Applications, giving two referees, must reach A. M. Harker, Esq., M.A. (Cantab), Central Sussex Manager, South Eastern Electricity Board, Electra House, Church Road, Haywards Heath, Sussex, by August 21, 1950.

ASSISTANT DISTRICT COMMERCIAL ENGINEER
Croydon District

Salary of £565 per annum under Class "F," Grade 9 of the N.J.B. Schedule, plus London addition. Applicants should be qualified engineers. Duties will include the technical and administrative control of an apparatus repair and reconditioning depot, and of employees engaged on maintenance and installation of apparatus in consumers' premises.

Applications, giving two referees, must reach A. E. Hawkins, Esq., B.Sc.(Eng.), A.M.I.E.E., Croydon Manager, South Eastern Electricity Board, Electric House, Wellesley Road, Croydon, by August 21, 1950.

ASSISTANT SUB-AREA COMMERCIAL ENGINEER
(Repair Shop Superintendent), Surrey Sub-Area

Salary £569 per annum under Class "J," Grade 11 of the N.J.B. Schedule. Person appointed will organise and supervise the work of the Sub-Area reconditioning and repair depot, with staff of 100 employees. Applicants should have experience of modern workshop practice and the reconditioning of all types of domestic electrical appliances, together with a good knowledge of office and stores procedure. Preference to corporate members of the I.E.E. or I.Mech.E., or equivalent qualifications.

SECOND ASSISTANT ENGINEER
(Operation and Construction)
Surrey Sub-Area Headquarters

Salary of £736 to £770 per annum under Class "J," Grade 7, of the N.J.B. Schedule. Applicants should preferably be corporate members of the I.E.E. and have had responsible practice in the construction, maintenance and operation of extensive urban and rural distribution systems.

Applications for the above two positions, giving two referees, must reach C. W. Hughes, Esq., B.Sc., M.I.E.E., Surrey Manager, South Eastern Electricity Board, Rough Rew, Horsham Road, Dorking, Surrey, by August 21, 1950.

FIRST ASSISTANT DISTRICT COMMERCIAL ENGINEER
West Kent District

Salary of £627 per annum, plus London addition, under Class "E," Grade 6, of the N.J.B. Schedule. Applicants to be qualified engineers with experience in the commercial department of an electricity undertaking covering service to all classes of consumers. The person appointed will assist the District Commercial Officer in the control and organisation of the department.

Applications, giving two referees, must reach P. S. Watson, Esq., A.M.I.E.E., M.I.I.A., West Kent Manager, South Eastern Electricity Board, 270 High Street, Orpington, by August 21, 1950.

Superannuation will be arranged for these positions.

A. L. BURNELL,
Secretary.

(F 596)

SINGAPORE MUNICIPALITY

ELECTRICITY DEPARTMENT

CHARGE ENGINEERS. Permanent Staff, required for shift duties in the Singapore Power Station. Present capacity, 37,000 kW, with proposed extensions to 87,000 kW.

Experience of extra high-tension 3-phase generation in a modern high-pressure steam power station is essential. Appointment subject to medical examination.

Basic salary scale, $440-$870 per month. Starting point according to qualifications and experience. Graduated scale of allowances, e.g., present allowance on $560 p.m. basic salary amounts to: Expatriation $110 p.m., plus cost of living, $192 p.m. for single man or $246 p.m. for married man, or $318 p.m. for married man with family. Annual increments, $30 p.m. Local taxation much lower than England. One Straits dollar equals 2s. 4d. Thus a married man with family on basic salary of $560 would draw equivalent of £1,383 sterling per annum.

Quarters, with heavy furniture, provided at 8 per cent. of salary or housing allowance up to 12 per cent. in lieu. Initial engagement on three years' agreement; eight months' leave after four years' service. Free medical attention. Passages paid, including family. Compulsory provident fund contribution, 7½ per cent. of salary, and Municipal Commissioners donate 7½ per cent. for first 10 years, rising to 20 per cent. after 20 years' service.

Applications, in duplicate, with full personal and technical information and copies of three testimonials, to Messrs. Peirce and Williams (agents to the Municipal Commissioners), 1 Victoria Street, London S.W.1. (F 444)

BRITISH ELECTRICITY AUTHORITY

PRINCIPAL ASSISTANT, PRODUCTION, INSPECTION AND TEST SECTION

Generation (Construction) Branch, Headquarters

APPLICATIONS are invited for the post of a Principal Assistant in the Production, Inspection and Test Section of the Generation (Construction) Branch at Headquarters in London.

The salary for this appointment, which is superannuable, will be within the provisional range £1,000 to £1,500 per annum.

Candidates should hold Associate membership of the I.Mech.E. or I.E.E. and have extensive experience in production, planning and progressing methods during manufacture of heavy engineering plant including turbo-alternators, condensers, feed heating plants, steam raising plants, switchgear, transformers, etc., as installed in a modern generating station.

Experience in inspection and test methods for the various types of plant mentioned above would be considered an advantage.

The successful candidate will be located at Headquarters in London, but will be expected to travel as necessary to the manufacturers' works in various parts of the country.

Forms of application may be obtained from D. Moffat, Director of Establishments, British Electricity Authority, British Electricity House, Great Portland Street, London W.1, and should be completed and returned to him not later than August 25, 1950. Please quote reference "AE.80." (F 582)

BRITISH ELECTRICITY AUTHORITY

South Wales Division

APPLICATIONS are invited for the following appointments in this Division at salaries in accordance with the Revised National Joint Board Schedule:—

(1) JUNIOR ENGINEER (Combustion) Divisional Headquarters, Class "AX.CX," Grade 9 (£375-£536 per annum).

(2) ASSISTANT COMBUSTION ENGINEER, Upper Boat Power Station, Class "H," Grade 9 (£609-£633 per annum).

(3) DRAUGHTSMAN, Upper Boat Power Station, Class "H," Grade 12 (£498-£518 per annum).

Candidates for (1) and (2) should preferably have obtained the Higher National Certificate or its equivalent and previous experience in the operation and efficiency control of high-pressure steam plant will be considered an advantage.

Candidates for appointment (3) should have had previous drawing office experience in connection with mechanical plant and a knowledge of electrical installations and layout will be an advantage.

The above salaries are provisional and subject to negotiation through the National Joint Board.

The appointments are superannuable under the British Electricity Authority and Area Boards' Scheme.

Forms of application may be obtained from the Divisional Secretary at the address below to whom completed applications should be returned not later than August 21, 1950, in sealed envelope endorsed with the appointment sought.

H. V. PUGH,
Divisional Controller.

Cardiff (Pengam Moors) Airport,
Cardiff.
July 31, 1950. (F 562)

BRITISH ELECTRICITY AUTHORITY

London Division

STATION SUPERINTENDENT—GROVE ROAD GENERATING STATION

APPLICATIONS are invited for the position of Station Superintendent at the Grove Road Generating Station, St. John's Wood, N.W.8.

Candidates should have received a sound technical and practical training in electrical and mechanical engineering, followed by a wide experience in the operation and maintenance of generating station plant.

They should also have had experience of administration and have had a successful record in dealing with works management and labour relations.

The successful applicant will be responsible for the efficient local management and operation of the Station, and will be in control of the technical, operating, maintenance and administrative staffs.

The salary and conditions of service will be in accordance with the revised National Joint Board Schedule, Class "F" Grade 1, plus London Allowance—£1 048 19s. per annum.

The appointment will be subject to the provisions of the British Electricity Authority and Area Boards' Superannuation Scheme.

Applications, stating age, qualifications and experience should be addressed to the Divisional Secretary, British Electricity Authority, London Division, Ergon House, Horseferry Road, Westminster, S.W.1, so as to be received within 14 days of the appearance of this advertisement.

J. N. WAITE,
Divisional Controller.
(F 578)

BRITISH ELECTRICITY AUTHORITY

Eastern Division

APPLICATIONS are invited for the following post:—

STATION SUPERINTENDENT, Brimsdown Generating Station, Enfield, Middlesex.

Salary in accordance with the revised N.J.B. Schedule, Grade 1, Class "J," (£1,224-£1,282 per annum plus London weighting).

The successful applicant will be responsible for the efficient local management and operation of the station. Applicants should have received a thorough technical and practical training, followed a career giving wide experience in the operation and maintenance of generating station plant, and also must have held a position of responsibility involving the control of technical, operating and administrative staffs. The successful applicant will be expected to reside within a reasonable travelling distance of the generating station.

The salary and conditions of service will be in accordance with the N.J.B. Agreement, and the appointment will be superannuable in accordance with the British Electricity Authority and Area Boards' Superannuation Scheme.

Applications should be made on forms of application obtained from the Divisional Controller, British Electricity Authority, Eastern Division, Northmet House, Southgate, N.14, to whom completed forms should be sent to arrive not later than August 31, 1950. Envelopes should be endorsed "Station Superintendent—Brimsdown."

W. N. C. CLINCH,
Controller.

Northmet House,
Southgate, N.14. (F 594)

TRINIDAD AND TOBAGO ELECTRICITY COMMISSION

APPLICATIONS are invited by the Trinidad and Tobago Electricity Commission, Port of Spain, Trinidad, B.W.I., for the following appointments:

(a) GENERAL MANAGER, age not less than 35 years. Salary $800 (B.W.I.) per month.

(b) ASSISTANT GENERAL MANAGER, age not less than 30 years. Salary $640 (B.W.I.) per month.

£1 = $4.80 (B.W.I.).

Appointments are on agreement for a period of three years in the first instance, and subject to medical examination by the Commission's medical adviser. Liberal vacation, casual and sick leave on full pay. Full first-class passages, and transport. A rent allowance is payable in some circumstances.

Candidates for either appointment should have a University degree in electrical engineering or be a Corporate Member of the Institution of Electrical Engineers, and have considerable recent experience in the administration and operation of public electricity supply undertakings with steam turbine and diesel engine driven generating plant, underground and overhead distribution and transmission up to 66 kv.

Applications by letter endorsed "Manager Trinidad", stating age, married or single, children, and full particulars of qualifications and experience, with references, and whether the applicant wishes to be considered for either appointment, must reach the undersigned within 21 days from the date of this advertisement. PREECE, CARDEW & RIDER, 8 Queen Anne's Gate, Westminster, S.W.1.
(F 593)

BRITISH ELECTRICITY AUTHORITY

Midlands Division

APPLICATIONS are invited for the position of THIRD ASSISTANT ENGINEER in the Generation Construction Department. The salary range will be in accordance with Schedule C of the National Joint Board Agreement, Grade 5, £579 to £753 per annum.

Candidates should have had a recognised training in mechanical engineering, sound practical experience in the construction and or erection of power station plant, and should possess Higher National Certificate or an equivalent qualification. The successful candidate will be required to supervise the installation of new plant at Walsall Generating Station, and on its completion at a new station within the Division.

Conditions of service will be in accordance with the N.J.B. agreement and superannuation under terms approved by the British Electricity Authority.

Forms of application should be obtained from the Divisional Establishments Officer, 53 Wake Green Road, Moseley, Birmingham 13, and should be returned not later than August 62, 1950.

F. W. LAWTON,
Divisional Controller.
(F 579)

BRITISH ELECTRICITY AUTHORITY

North Eastern Division

SECOND ASSISTANT TRANSMISSION ENGINEER

APPLICATIONS are invited for the appointment of Second Assistant Transmission Engineer in the Transmission Department at Divisional Headquarters, Newcastle upon Tyne.

Applicants should have had experience in the maintenance of high voltage switchgear, overhead lines, cables, transformers and records relating thereto. Some knowledge of construction work and design would be an advantage. Applicants should preferably be corporate members of the Institution of Electrical Engineers or hold equivalent qualifications.

The salary for this appointment will be in accordance with Grade 2, Schedule C, of the National Joint Board Agreement, £752-£938 per annum and will commence at a point commensurate with qualification and experience.

Superannuation will be in accordance with the British Electricity Authority and Area Boards Superannuation Scheme.

Forms of application may be obtained from the Divisional Secretary (Establishments), British Electricity Authority, North Eastern Division, Carliol House, Newcastle upon Tyne 1, to whom they should be returned to arrive not later than Saturday August 19, 1950. (F 586)

BRITISH ELECTRICITY AUTHORITY

South Western Division

ASSISTANT MAINTENANCE ENGINEER (MECHANICAL) PORTISHEAD GENERATING STATION

APPLICATIONS are invited for the appointment of Assistant Maintenance Engineer (Mechanical) at Portishead Generating Station.

The salary offered will be in accordance with the National Joint Board Schedule A, Class "J," Grade 8 (£685 to £715 per annum), but this salary and grading must be regarded as provisional pending the results of negotiations at present proceeding through the National Joint Board.

Applicants must have had a thorough practical mechanical engineering training and should have had considerable experience in the maintenance of turbines, boilers and auxiliary plant. Corporate membership of the Institution of Mechanical Engineers or an equivalent qualification would be considered an advantage.

The conditions of service will be in accordance with the N.J.B. Agreement and the appointment will be superannuable under the terms of the British Electricity Authority and Area Boards' Superannuation Scheme.

Applications, stating age, qualifications, experience, etc., should be addressed to the Divisional Secretary, British Electricity Authority, South Western Division, British Electricity House, 26 Oakfield Road, Bristol 8, so as to arrive not later than August 21, 1950.

R. C. BARRETT,
Divisional Secretary.

August 4, 1950. (F 599)

AN ASSISTANT ELECTRICAL ENGINEER (age group 25-32) is required by the South-West Lancashire Factory of a large Industrial Organisation. University degree or equivalent qualifications with experience of industrial installations and maintenance of electrical equipment are essential. Applications (in writing) giving full particulars of age, training and experience to be addressed to Box No. 1589, Electrical Times. (F 572)

AREA CONTRACTS ENGINEER. Enfield Cables Limited seek experienced Contracts Engineer, accustomed to organising and supervising industrial and underground electric cable contracts up to highest voltages, and able to take charge of an area in Southern England. Details, in confidence of age, training, experience and salary required to C. J. Armstrong, M.I.E.E., Enfield Cables Limited, Victoria House, Southampton Row, London W.C.1. (F 539)

SOUTH WESTERN ELECTRICITY BOARD

APPLICATIONS are invited for the following positions in the Board's Central Construction Department with Headquarters at Taunton:—

(a) GENERAL ASSISTANT ENGINEER (Field Construction). Commencing salary £463 p.a. (Class "AX," Grade 8 (2), N.J.B. Schedule).

(b) JUNIOR ENGINEER (Field Construction). Commencing salary £427 p.a. (Class "AX," Grade 9 (3), N.J.B. Schedule).

The successful candidates will be responsible for duties connected with surveys for and the construction of overhead lines of all classes up to 33 kV, and for the co-ordination of operation time studies; for post (a) he will also be required to undertake the planning and supervision of construction of sub-stations up to and including 33 kV. Candidates for posts (a) and (b) should have had a minimum of two years and one year respectively in charge of construction gangs in the field.

Applications, giving age, present appointment and salary, qualifications and experience, to be submitted to the Assistant Secretary (Establishments), South Western Electricity Board, Electricity House, Colston Avenue, Bristol 1, within ten days. (F 597)

MERSEYSIDE AND NORTH WALES ELECTRICITY BOARD

APPOINTMENT OF INSTALLATION SUPERVISOR

Wallasey District

APPLICATIONS are invited for the appointment of Installation Supervisor in the Wallasey District of No. 3 Sub-Area of the Board at a provisional salary of £475 per annum, subject to any variation as may be necessary after negotiation with the appropriate staff organisation.

Duties will include the preparation of estimates, and the supervision of installations on domestic, commercial and industrial premises, and the possession of the Higher National Certificate in Electrical Engineering would be an advantage.

The successful candidate may be required to undergo a medical examination, and, if eligible, will be required to contribute to a superannuation scheme.

Requests for an application form must be made in writing to the Manager, No. 3 Sub-Area, Merseyside and North Wales Electricity Board, Electricity House, Newgate Street, Chester, and upon completion returned to him in a sealed envelope endorsed "Installation Supervisor" so as to be received not later than August 28, 1950.

JAMES RANKIN,
Secretary.
(F 598)

ABERDARE CABLES, LTD., Aberdare, require immediately two experienced ESTIMATORS for handling overseas enquiries for paper insulated cables. State salary required and experience. (F 486)

ARTHUR SCULL & SON LTD., offer attractive opportunity to ELECTRICAL ENGINEER with sound Technical and Commercial experience. Please apply in confidence with full particulars to the Director, Kingsway House, London W.C.2. (F 576)

ARTHUR SCULL & SON LTD., require experienced and energetic STAFF SUPERVISOR. Apply with full particulars to the Director, Kingsway House, London W.C.2. (F 577)

BRUCE PEEBLES & CO., LTD., Edinburgh 5, require fully qualified ELECTRICAL DESIGNERS for design of all types of induction motors up to 250 b.h.p.—Apply, stating age and giving full details of education, training, experience and salary required to Manager, Rotating Plant Department, at above address. (F 568)

BUYER/STOREKEEPER required by well-known London Contractors. Must have had similar stores' experience. Permanent position, ample scope and comparable salary offered to youngish man with energy and intelligence. Details of experience, age and salary required to Box No. 1581, Electrical Times. (F 537)

DRAUGHTSMAN with experience of large transformer manufacture required by electrical engineering company in North-East London. Permanent position, with superannuation scheme, for suitable applicants. Good salary and working conditions. Write, stating age, experience and salary required, to Box No. 1545, Electrical Times. (F 453)

DRAUGHTSMEN : Senior Draughtsmen required to work in the Manchester district; experience in light mechanisms for relay and small electric equipment, knowledge of power railway equipment an advantage. —Reply, in writing, stating age, training, qualifications and salary required, marking envelopes "Power," to: Box No. 1575, Electrical Times. (F 529)

DRAUGHTSMEN with experience in the fabrication of large steel tanks and vessels required by electrical engineering company in North-East London. Permanent position, with superannuation scheme, for suitable applicants. Good salary and working conditions.—Write, stating age, experience and salary required, to Box No. 1547, Electrical Times. (F 454)

CABLE SALES ENGINEER required for Midland Area to develop sales of rubber insulated cables. Applicants must have an intimate knowledge of rubber cables and preferably a good connection with commercial, industrial, electricity supply and municipal undertakings. Applications, giving details of experience, age and salary required, should be sent to Mersey Cable Works Limited, Linacre Lane, Bootle, Liverpool 20. (F 543)

ELECTRICAL DRAUGHTSMAN required by major oil company for service in the Middle East. Must have served five years electrical engineering apprenticeship, and have had five years D.O. experience in connection with electrical layouts of large industrial plants with underground cable networks. Should possess Higher National Certificate. Graduate or associate membership of a corporate engineering body desirable but not essential. Maximum age limit 35 years. Attractive salary plus generous allowance in local currency. Free passages out and home, free medical attention, kit allowance, good leave arrangements. Pension scheme.—Write, giving personal particulars and details of qualifications and experience, quoting Dept. F.192, to Box No. 2809, at 191 Gresham House, Old Broad Street, E.C.2. Applicants without above requirements will not be considered. (F 322)

ELECTRICAL ENGINEERS required for service in Middle East. Applicants should (*a*) possess Ordinary or Higher National Certificate and have had full apprenticeship with heavy electrical equipment manufacturers or with a large colliery or allied fully electrified industry, or (*b*) possess a degree and have had two years' technical apprenticeship with similar firm to above. In each case applicants must have had at least three years' subsequent experience on the installation and maintenance of heavy electrical equipment. Maximum age limit 35 years. Attractive salary, plus generous allowance in local currency, free passages out and home free medical attention, kit allowance, good leave arrangements, pension scheme.—Write, giving personal particulars and details of qualifications and experience, quoting Dept. F.191, to Box No. 2593, at 191 Gresham House, E.C.2. (E 415)

ENGINEERING firm in Harrow area has an opening for CONTRACTS ENGINEER. Must be capable of conducting correspondence with clients and suppliers. We manufacture specialised electrical equipment, and some knowledge of steam engineering and basic mechanical engineering is desirable as well as electric engineering practice.—Apply Chief Engineer, Bastian and Allen, Ferndale Terrace, Harrow, Middx. (F 589)

EXPERIENCED ELECTRICAL LAYOUT DRAUGHTSMEN required immediately. Knowledge of aircraft electrics preferred but not essential.—Apply, stating age and details, etc., to Staff and Labour Manager, The Bristol Aeroplane Co., Ltd., Aircraft Division, Filton House, Bristol (F 4[illegible])

EXPERIENCED LINESMEN required for power line construction work in all parts of the British Isles. Rates of pay in accordance with Civil Engineering Construction Conciliation Board's agreement. Please apply in writing to Contract Department, Henley's Telegraph Works, 51/53 Hatton Garden, London E.C.1, giving details of recent experience and employers. (F 574)

PLUMBER JOINTERS wanted for large contracts in Scotland and North England. Must be accustomed to voltages up to 11kV. Out allowance and good rates paid to suitable applicants.—Apply, Millar and Stables, 16 Northumberland Street, Edinburgh. (F 585)

POWER STATION ENGINEER, fully qualified and with at least 5 years' practical experience, required by British managed company in India. Age 27/28. Commencing salary approximately £1,150 p.a. Free quarters, medical attention and passages provided. Pension scheme. Applications in writing giving full details of qualifications and experience to Box 3603, c/o Charles Barker & Sons Ltd., 31 Budge Row, London E.C.4. (F 570)

CONTROL ENGINEERS

CONTROL ENGINEERS for network operation required by Major Oil Company in Middle East for control centre covering operation of extensive overhead and underground transmission and distribution networks up to 66 kV. Applicants must possess Ordinary or Higher National Certificate in Electrical Engineering, and must be experienced in the operation of indoor and outdoor metal-clad switchgear at all voltages, transformers and associated substation equipment. Age not over 35. Attractive salary, plus generous allowance in local currency, free passages out and home, free medical attention, kit allowance, good leave arrangements, Pension Scheme.—Write, giving personal particulars and details of qualifications and experience, quoting:

DEPARTMENT F.116 TO BOX NO. 2584 AT 191 GRESHAM HOUSE, E.C.2. (E 389p)

LARGE Manufa turing firm invite applications from fully qualified ELECTRICAL DESIGNER experienced in all types of large and small d.c. machines.—State age, education, experience and salary required to Manager, Rotating Plant Department, Bruce Peebles & Co., Ltd., Edinburgh 5. (F 569)

MALE CLERK required for London sales office, with experience of engineering equipment.—Apply, giving full particulars, to General Sales Manager, Worthington-Simpson, Ltd., Queen's House, Kingsway, W.C.2. (F 385)

REQUIRED for Middle East, all-round ELECTRICIAN with experience in conduit, Pyrotenax and general electrical installation work, able to read drawings. Free passage out and return, free quarters, messing and medical attention. Leave granted, and monthly salary. Apply, stating age and experience. Forward copies of testimonials or state names to whom we may apply.—Reply to Box No. 1591, Electrical Times. (F 581)

SENIOR DEVELOPMENT DRAUGHTSMAN required for oil circuit breakers and switchgear up to 11 kV and general switchgear development. Salary commensurate with ability. Manchester district.—Full details of experience, technical education and salary required to: Box No. 1559, Electrical Times. (F 508)

SHIFT CHARGE ENGINEERS for Electricity Supply Undertaking in Bagdad. Applications are invited from suitably qualified Engineers, preferably between 25 and 35 years of age, who have had experience in the operation of a power station of at least 15,000 kW with medium pressure boilers. Salary £1,000 to £1,200 per annum plus high cost of living allowance. Free house with heavy furniture will be supplied or a monthly house allowance of £12, in lieu.

Three year contract, renewable, with first class passage each way for successful applicant and family (if married). Three months leave on full pay in U.K. on completion of 24 consecutive months in Iraq, first class leave passages being paid. Box No. 1587, Electrical Times. (F 556)

TECHNICAL REPRESENTATIVE selling commercial lighting fittings and installations in London, required immediately. State age, experience.—Box No. 1557, Electrical Times. (F 503)

TECHNICAL SALES REPRESENTATIVES required for London and Home Counties, with experience of pumping machinery preferred, but not essential.—Apply, giving full particulars, to General Sales Manager, Worthington-Simpson, Ltd., Queen's House, Kingsway, W.C.2. (F 384)

THE General Electric Company, Ltd., has several vacancies in their Overseas Sales Organisation for young professional ELECTRICAL ENGINEERS. Applicants should be between 22-30 years and preferably single. The qualifications required are a degree or a higher national certificate in electrical engineering, together with an apprenticeship in the electrical manufacturing or contracting industries. Salary and allowances according to qualifications and territory concerned.—Apply, giving particulars of age, education, training and experience, to Staff Manager, G.E.C., Magnet House, Kingsway, W.C.2. (F 587)

THE General Electric Company, Ltd., invites applications for the positions of RESIDENT ENGINEER in certain tropical and semi-tropical territories. These are senior appointments and applicants must have had wide and responsible experience as electrical engineers. A professional engineering qualification coupled with an apprenticeship served with an electrical manufacturer is essential. Previous overseas service desirable. Age not more than 40 years. These positions will carry a substantial salary.—Apply, giving particulars of age, education, training and experience, to Staff Manager, G.E.C., Magnet House, Kingsway, W.C.2. (F 588)

GENERAL MANAGER FOR CABLE WORKS

Applications are invited for the post of General Manager of Cable Works specialising in the manufacture of rubber sheathed cables. Number of employees 500/700. Salary ; £1,750-£2,000 according to experience and qualifications. Previous experience in the production of this class of cable essential and applicants must be between 40 and 50 years of age.

WRITE GIVING FULL DETAILS OF EXPERIENCE TO BOX No. 1595

(F 590p)

THE Steel Company of Wales, Ltd. (Steel Division), have vacancies for the following:

4 SENIOR CONTROL ENGINEERS at the Margam Works Power Plant.

4 SHIFT CONTROL ENGINEERS for the Abbey Works Control Room.

Applicants must be able to produce evidence of:

1. General and technical education.
2. Experience in the control of and interconnected h.t. power system.
3. Some experience of power plant operation.

Salaries will be within the range of £475 to £525 per annum, according to age and experience.

Applications should be addressed to:

The Superintendent, Personnel Services,
P.O. Box No. 9,
Port Talbot,
Glam.

and dispatched to arrive not later than one week after the date of publication of this advertisement. (F 582)

TRANSFORMER ENGINEER required to take charge small works. South East London Area. Distribution Transformers up to 500 kVA. Design experience an advantage. Write stating age, experience, and salary required. Thermocontrol Installations Co. Ltd., 2-10 Valentine Place, London S.E.1. (F 575)

TRANSFORMER ESTIMATOR TECHNICAL CORRESPONDENT required. Must be capable of dealing with tenders for home and overseas business and be experienced in that direction. Practical experience an advantage. Applications, stating age, qualifications, experience and salary required should be addressed to the Employment and Welfare Manager, Messrs. Johnson and Phillips, Ltd., Victoria Way, Charlton, S.E.7. (F 487)

VICKERS-ARMSTRONGS, LTD., Weybridge, invite applications for the post of PROJECT ENGINEER to be in charge of certain special projects. Qualifications required for the post include experience of control methods and knowledge of electronics and instruments.—Write stating experience and qualifications, to Employment Manager, Weybridge Works. (F 505)

VICKERS-ARMSTRONGS, LTD., Weybridge, invite applications for the post of ELECTRONIC ENGINEER to take part in electronic side of special projects.—Write, stating experience and qualifications to Employment Manager, Weybridge Works. (F 506)

APPOINTMENTS WANTED

O.N.C. (ELEC.), exp. D.O., generation, requires post with small engineering firm. Test-bed or work requiring good theoretical knowledge. B'ham, Coventry, Leicester area.—Box No. 1549, Electrical Times. (F 477)

SALES ENGINEER (35), A.M.I.E.E., requires post with scope for initiative. Midland area. Car owner.—Box No. 1541, Electrical Times. (F 441)

WORK WANTED

A.C. and d.c. Motor Rewinds and Repairs. Prompt service, fully guaranteed.—Edgware 8631 (4 lines). Service Electric Co., Ltd., Stanmore, Middx. (D 324)

ARMATURE ROTOR AND STATOR WINDING. We specialise in the repair and rewind of all types of electrical machines from fractional h.p. upwards. Special departments for vacuum cleaners, dryers, portable tools, etc. All work fully guaranteed.—Walter Crane, Greencoat Electrical Works, Westgate, Wakefield. Telephone 2172. (A 4)

CASTINGS, Fisher Foundries, Ltd., Great, Birmingham, have capacity for brass, gun metal and soft grey iron machine moulded repetition castings weighing 1-30 lb. Loose pattern work up to 3 cwt. Delivery by road to all parts. Tel.: B'ham, Victoria 0197. (F 270)

EXPORT and home enquiries welcomed for large quantities of P.V.C., T.R.S., V.I.R. ELECTRIC CABLES; guaranteed condition to B.S.S. by well-known British and American manufacturers.—Electrotherm, 444 High Road, London W.4. Telephone: Chiswick 4125. (F 584)

ZEROS REFRIGERATORS.—Complete range of repair and service now available. Equipment reconditioned to conform to pre-war manufacturers' specifications.—Time Engineers, Refrigeration Specialists, 60 Southend Road, Rainham, Essex. Tel.: Rainham 2358; or Southern Area Agency. Tel.: Springpark 4217. Electrical Spares supplied to the trade. (A 639)

WANTED

A.C./D.C. MOTORS, STARTERS, complete change-over installations, etc.—A.A. Electrical Co., Ltd., 67 Rothschild Road, Chiswick Park, W.4. Phone: Chiswick 5105. (A 20)

WANTED.—D.C. and a.c. ball-bearing MOTORS.—Full details to Britannia Manufacturing Co., Ltd., 22/26 Britannia Walk, London N.1. (A 13)

WANTED, ROTARY CONVERTERS, any size.—Universal, 221 City Road, London E.C.1. (A 16)

WANTED for prompt cash, ferrous and non-ferrous SCRAP; also plant for dismantling. Buyers of second-hand machinery and plant for re-use.—W. and H. Cooper, Ltd., 176 Brady St., Bethnal Green E.1. (A 1)

WANTED.—Large quantity of 4-in. outside diameter TUBES from the dismantling of old Babcock Water-tube Boilers. Best prices paid. Prepared to purchase Babcock and Wilcox Water-tube Boilers for dismantling. —Apply, giving full details to Midland Iron and Hardware Co., Cradley Heath (A 5)

WANTED, large stocks Govt. surplus V.I.R., T.R.S., P.V.C. ELECTRIC CABLES. First-class condition by well-known makers only.—Box No. 1593, Electrical Times. (F 583)

AGENCIES

MANUFACTURERS' AGENTS ASSOCIATION, INC. (E.T.), 8 Bream's Buildings, London W.C.2, supplies free lists of Agents to Manufacturers seeking representation in important industrial centres. Membership available to established agents only. Particulars supplied. (A 7)

BUSINESS OPPORTUNITIES

ACTIVE DIRECTOR required to develop Sales Business in well-established contracting company. East coast town. £1,000 investment. Salary and profits.—Box No. 1569, Electrical Times (F 516)

FOR SALE

CABLES & WIRE

CABLE, 50,000 yd 19·012, by well-known makers, far below manufacturers' price.—Box No. 1585, Electrical Times. (F 554)

DOMESTIC APPLIANCES

COMMERCIAL IRONS for all purposes.—Donaldsons Wireless Electric Irons, 31 Sloan Street, Leith. (A 163)

IMMERSION HEATERS. Grubb 2 kW and 3kW standard voltages, all lengths, 12 in. to 36 in. Also 4kW (non-taxable), 16 in. to 36 in. Fully guaranteed and immediate delivery. For illustrated brochure, latest lists and trade terms write distributors, John Owner and Co., Springfield Road, Birmingham 13. Tel.: Spr. 2839. (C 392)

ENGINEERING PLANT & MATERIALS

THE following Heavy Gauge Solid Drawn CONDUIT TUBING for disposal at List Prices Less 20 per cent.

17,000 ft. 1¼ in. Black Enamelled.
2,000 ft. 1¼ in. Galvanised.
11,000 ft. 1½ in. Black Enamelled.
4,000 ft. 1½ in. Galvanised.
1,500 ft. 2 in. Galvanised.

Inquiries to:—Stores Controller, Courtaulds Ltd. Coventry. (F 573)

WELDING PLANT. Several Motor Generator Arc Welders, single, double and multi-operator up to 600 amps, input 400/440 V, 3-phase, 50 cycles. Also several single and double operator oil cooled transformer welders. All modern units by well-known makers. Attractive prices.—Full details write: Thos. W. Ward Ltd., Albion Works, Sheffield. (E 111)

LADDERS (wooden and aluminium, all types), Trestles, Steps, Handcarts, etc., from Ramsay and Sons (Forfar) Ltd., Forfar (Tel. 172). (C 603)

GENERATING PLANT

ALTERNATORS from stock, 400/440 V, 3-phase, 50 c/s, with Exciters and switchboards. 80 kVA "GEC" 1,000 r.p.m. 40 kW "ECC," 750 r.p.m. 28 kVA "Crompark," 1,500 r.p.m.—Full details, write: Thos. W. Ward Ltd., Albion Works, Sheffield. Phone 26311 (ex 347). (E 109)

DIESEL ALTERNATOR SETS in stock, standard voltages, single and three phase. Details post free on request.—Thos. W. Ward, Ltd., Albion Works, Sheffield. Tel. 26311 (ex 347). (E 108)

FOR SALE.—MOTOR GENERATING SET: G.E.C 150 h.p. 400 V, 3-phase, 50 c/s, slipring induction motor direct-coupled to a 100 kW d.c. G.E.C. generator, 220 V, 1,500 r.p.m., with two-panel d.c. switchboard.—London Brick Company Limited, Africa House, Kingsway, London W.C.2. (F 540)

THE Electroplant Co., Wembley, for any type of special duty electrical plant. Specialities: CONVERTORS, GENERATING SETS, ELECTRICAL TEST EQUIPMENT. Ask for production range. (E 445)

WELDING GENERATOR, Fuller, 400/440 volt, 3-phase input, 175 amps, d.c. welding current; little used.—Apply Conder Engineering Co., Ltd., Winnall, Winchester. Tel.: 2683 (F 567)

1 ALTERNATOR, G.E.C. 6 500 kW 0·9 power factor 6.6 kV 3-phase 50 c/s, at 500 r.p.m. Two-bearing Alternator, complete with exciter and bed plate together with panel.—Apply: C. J. Rice, 137 Mayplace Road West, Bexleyheath, Kent. Tel.: Bex. 3282. (F 494)

100-kVA MODERN DIESEL ALTERNATOR SET, comp. Vert. 6-cyl. Diesel engine direct coupled to alternator on baseplate, 400/230 V, 3-phase, 50 cycles, 4 wire. Details on request.—Thos. W. Ward, Ltd., Albion Works, Sheffield. Tel. 26311 (ex 347). (E 112)

LIGHTING EQUIPMENT

FLUORESCENT LAMPS AND CHOKES, Neon and other special lamps, British and American. Inquiries invited.—Suplex Lamps Ltd., 239 High Holborn, London W.C.1. (F 553)

FLUORESCENT LIGHTING. Big trade reductions. 80 w, 5-ft. Trough Reflector or Batten Fitting, white stoved, with ballast 210-240 V a.c. and tube, 3 gns. nett, collected. List sent.—Malden Transformer Supplies, opp. G.P.O., George Street, Richmond, Surrey. Ric. 3519. (F 603)

FLUORESCENT SHELLS.—High quality stoved troughs 14s. 9d. Hexagon battens 17s. 6d., others pro rata. Complete fittings fully guaranteed at very competitive prices.—Cowling & Holdsworth, No. 1 Factory, Romside Trading Estate, North Street, Romford 7282. (F 63)

LIGHTING FITTINGS. Eighty 18-in. Mazdalux Vitreous Enamelled Reflectors, with chokes, capacitors, and 400-watt fluorescent lamps. Offer required by W. J. Furse and Co. (Manchester), Ltd., 20 Mount Street, Manchester 2. The equipment can be inspected by appointment at Patons and Baldwins' warehouse, Brentford. (F 602)

PURLEY CHOKES AND BALLASTS. Silent operation, excellent performance, efficient, long life, vacuum impregnated, quick delivery. Low price (e.g. Purley Queen, 80 watts, 14·6 each, less quantity and cash discounts). Quotations for export.—F. W. Blansbard, Ltd. (Dept. ET), Purley, Surrey. (E 343)

METERS

A.C. and D.C. quarterly and prepayment METERS. Electric Meter Co., Melville Lane, Torquay. (F 456)

HOUSE service METERS from 5/-, guaranteed two years. —Electric Meter Co., Melville Lane, Torquay. (F 457)

HOUSE SERVICE METERS, a.c. or d.c., quarterly or prepayment.—Universal Electrical, 221 City Road, London E.C.1. (C 51)

METERS A.C. AND D.C. new and reconditioned, all types. Quarterly, single and three-phase, 3- and 4-wire 2½ to 1,000 amp. Prepayment, single and double tariff, single, dual and triple coin, fixed and variable tariff, 2½ to 50 amp M.D.I. Billiards switches, rent collectors. Prices from 5/-, carriage paid, two-year guarantee. Immediate delivery. Illustrated catalogue from the Electric Meter Company, 16 Melville Lane, Torquay. (F 455)

MOTORS & STARTERS

A.A. ELECTRICAL CO.—FOR A.C./D.C. MOTORS, SWITCHGEAR, EXHAUST FANS, HOISTS, REDUCTION GEARS, new or reconditioned units.—Chiswick 5105, Fairlands 8279, 67 Rothschild Road, W.4. (A 19)

ELECTRIC MOTORS, GENERATORS, TRANSFORMERS A.C. & D.C.
STARTERS, SLIP RING & D.C., SEMI-AUTOMATIC
Any voltage, new, short delivery, all types of revolving electrical power.
ELECTROPOWER COMPANY LIMITED
Kingsbury Works, Kingsbury Road, London N.W.9.
Telephone: COLindale 4621/2. (D 17p)

A. C. and D.C. MOTORS, Alternators, Generators, Generating Sets, Transformers, Welding Equipment, Plating Plant, Control Gear, Switchgear, Portable Electric Tools, etc., etc.—Write for current electrical stock list, post free. Thos. W. Ward, Ltd., Albion Works, Sheffield. Tel. 26311 (ex 347). (E 107)

A. C. and D.C. MOTORS, GENERATORS, from stock.—Service Electric Co., Ltd., Honeypot Lane, Stanmore, Middx. Edgware 9091/4. (A 476)

A. C. and D.C. MOTORS, GENERATORS, SWITCHGEAR, etc., always in stock. Let me have your inquiries.—G. E. Whittaker, Wellington Mill, Bolton Road, Blackburn. Tel. 7232. (A 12)

A. C. and D.C. MOTORS, all sizes, large stocks, fully guaranteed.—Milo Engineering Works, Ltd., Milo Road, East Dulwich, S.E.22 (Forest Hill 2278-9). (A 10)

BRAND new a.c. MOTORS from stock: 1/3rd to 90 h.p. slip ring and squirrel cage, 400/440 V, 3-phase, 50 cycles at 750, 1000 and 1,500 r.p.m. With or without control gear. Prompt despatch. Attractive prices. Detailed list on request.—Thos. W. Ward Ltd., Albion Works, Sheffield. Tel. 26311 (ex 347). (E 110)

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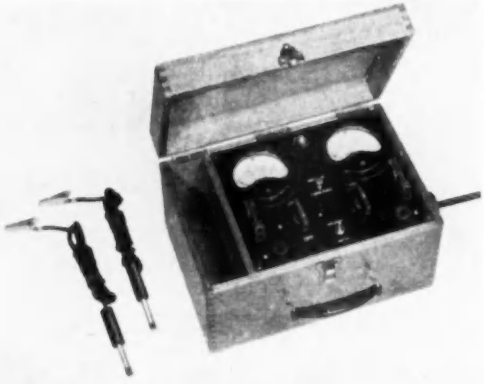

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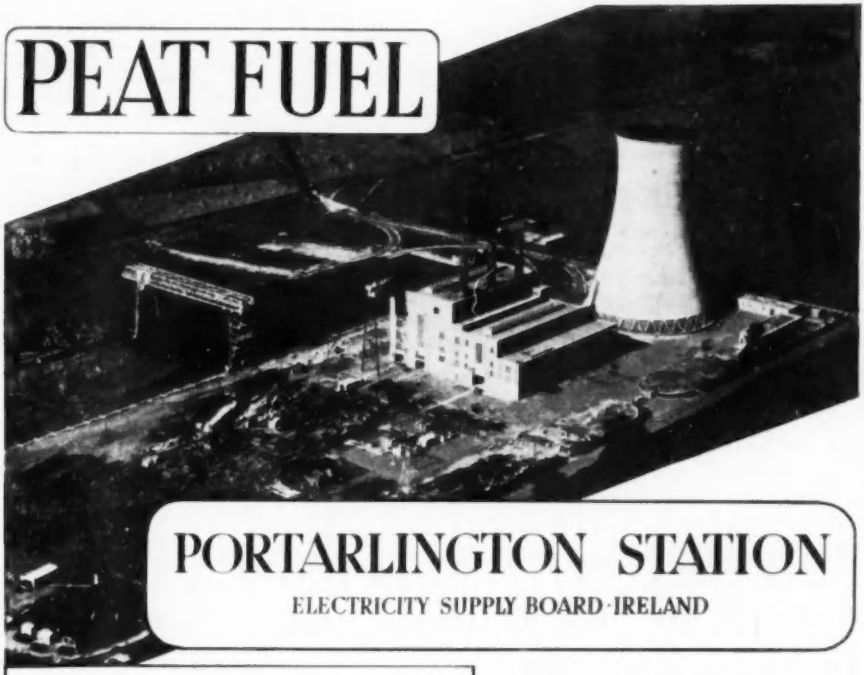

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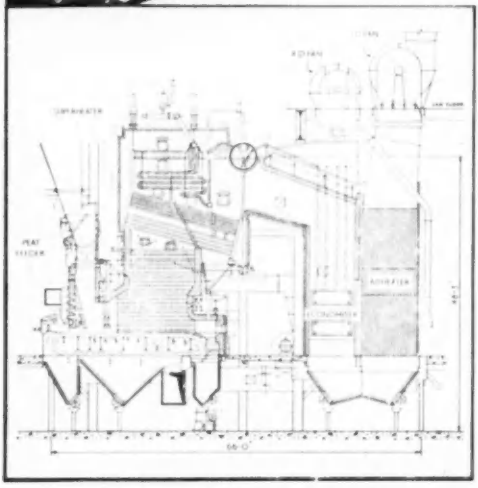

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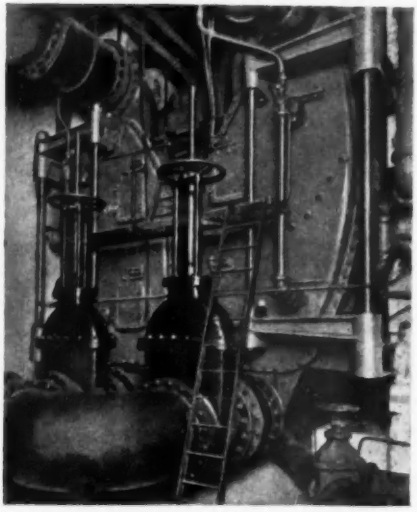

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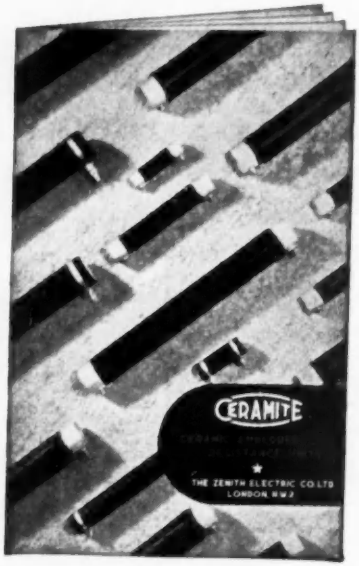

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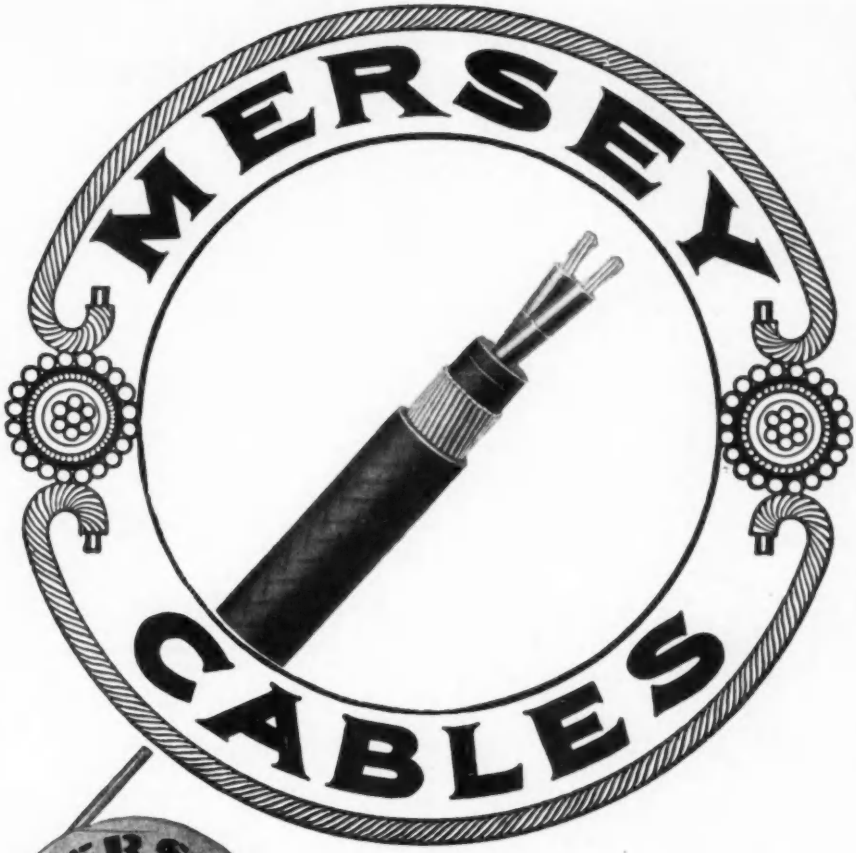

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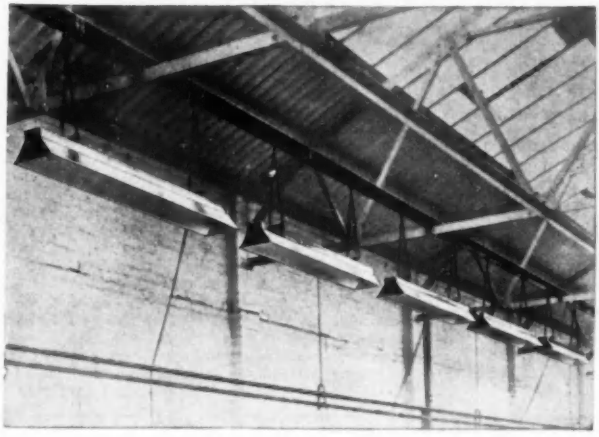

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Out of the NEW **EGA** *range...*

Mity Atom

5-10 AMP. SWITCHFUSE

The MITY ATOM is an all-porcelain switchfuse primarily designed for lighting circuits and the control of small domestic loads.
By virtue of its unique design, the MITY ATOM is produced at a low price and yet retains electrical and mechanical strength comparable with switchfuses of a more complicated design.

Descriptive Leaflet No.S.F.I.35.

EGA ELECTRIC LTD

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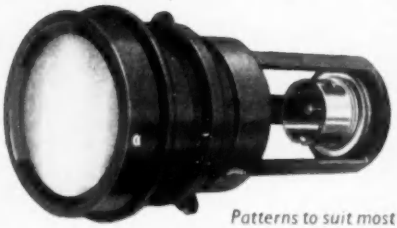
SM/EGA68/1

INDICATOR FITTINGS



Patterns to suit most requirements—send for list

also makers of
LIGHTING FITTINGS
SOCKET AND PLUG EQUIPMENT
SWITCH AND FUSE GEAR

WILLIAM
McGEOCH & Co. Ltd.
Warwick Works, BIRMINGHAM, 10
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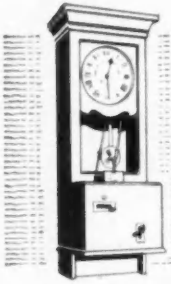


MAN-HOURS

Production costs are the sum of materials, overheads and man-hours . . . and the greatest of these is man-hours. Gledhill-Brook Recorders provide an accurate record of working time, and the relative statistics for an analysis of overtime and varying wage rates. The Gledhill-Brook System is essential equipment in every serious effort to improve production.

GLEDHILL-BROOK
TIME RECORDERS
and COSTING SYSTEMS

Enquiries to—
GLEDHILL-BROOK TIME RECORDERS LTD.
60, Empire Works - - Huddersfield

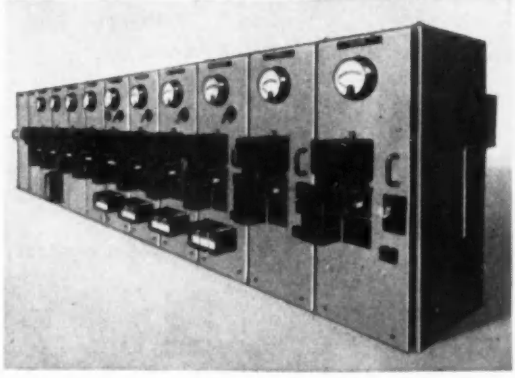
Switchgear for Industrial Service

Unit construction to facilitate erection and extension

Above : Composite switchboard of Class AG1 and AG2 air-break equipments installed in the Reid N.Z. Rubber Mills to the order of the National Electrical and Engineering Co., Ltd., New Zealand.

Right : Class AJ21 air-break switchboard supplied to the order of Messrs. Spearing & Co., Ltd., for the Iraq Petroleum Company

Ratings :—
Class AG up to 25MVA., 660 volts
„ AJ „ „ 35MVA., 660 volts



BTH manufactures all types of switchgear.

BRITISH THOMSON-HOUSTON
THE BRITISH THOMSON-HOUSTON CO., LTD., WILLESDEN, ENGLAND

A3983

WARDS for Rails & Sidings

The Photograph shows an example of a single slip layout which was recently installed at a colliery in S. Yorkshire

Because Ward's planned siding construction combines sound railway technique with wide experience of operating conditions, there is a technical excellence about a Ward-built siding which makes for low operating costs and minimum maintenance charges.

This is a point of primary importance to the present-day owner-operator of private railway sidings.

ANOTHER ASPECT OF TWW SERVICE

The Railway Siding Consultants and Contractors

THOS. W. WARD LTD

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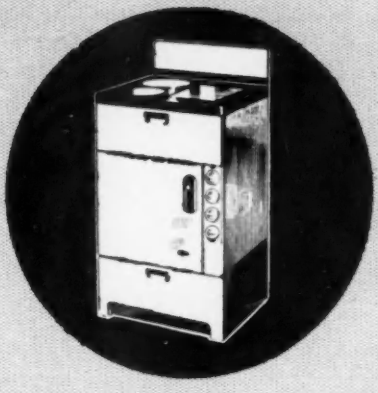
Printed in England for the Proprietors, THE ELECTRICAL TIMES, LTD., by SUN PRINTERS, LTD., London and Watford, Herts., and published at Sardinia House, Sardinia Street, Kingsway, London W.C.2. August 10, 1950.



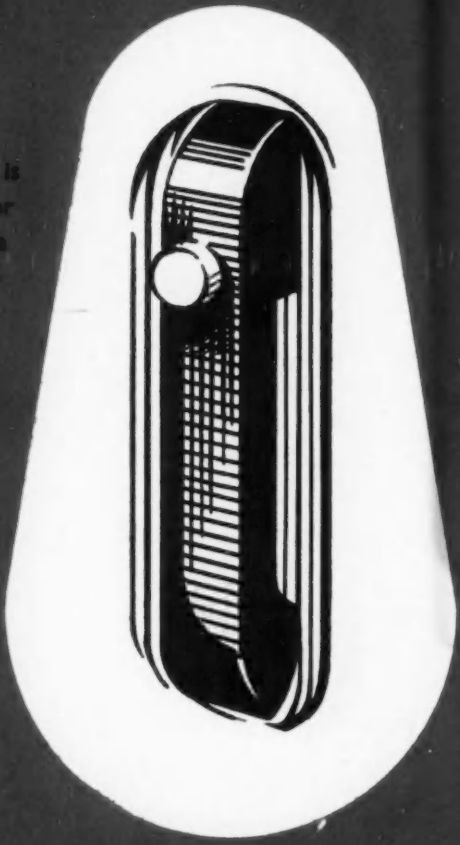
What's cooking?

Is it a cake? — Anything that's likely to suffer from harm through the banging of the oven door? — THEN the *Parnall Magnetic Catch* is the only satisfactory answer!

PARNALL POINTS OF PERFECTION

Magnetic Door Catch.

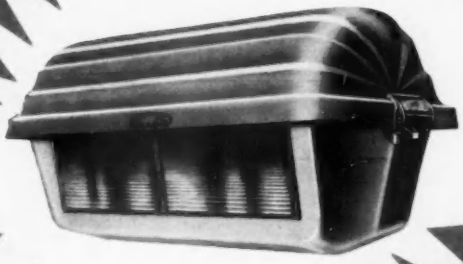
The patent Parnall Magnetic Door Catch is strong, positive in action and avoids door slamming or oven jarring. It consists of a permanent magnet of Alnico (alum-nickel-cobalt) a new material of great strength and true permanence. The magnet engages a spring-loaded keeper in the door which it holds with a pressure of 6lbs., and is operated by merely pressing the red button, which is conveniently fitted in the door handle. This magnetic catch is exclusive to the Parnall cooker. A similar catch is used on the hot-cupboard door.



PARNALL

PARNALL (YATE) LIMITED · 43 PARK STREET · LONDON · W1

STREET LIGHTING UNITS



"SOLWAY" LANTERN

Aluminium alloy canopy. Refractor bowl, transparent plastic material. For 85/140 W sodium lamp. Leaflet L35/31.

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Feed water evaporators

SINGLE, DOUBLE & TRIPLE EFFECT

WITH VAPOUR RECOMPRESSION FOR HIGHEST EFFICIENCY.

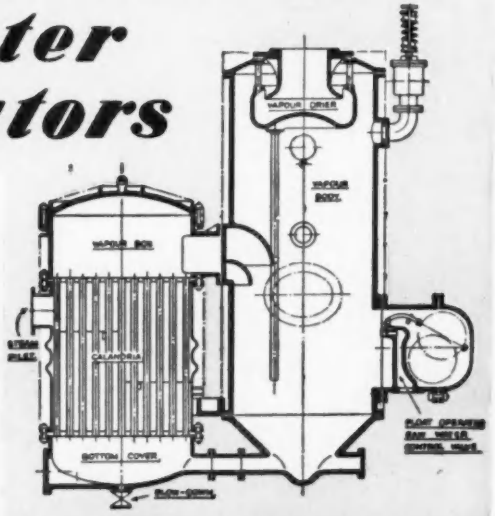
Low Vapour Velocity— High Condensate Purity

Ample Surface— Infrequent Cleaning

Straight Tubes— Easy Access

The drawing shows the sectional arrangement of a single effect Evaporator.

H104A



HICK HARGREAVES AND COMPANY LTD BOLTON